Revised April 2015

UPPER SANTA CLARA RIVER WATERSHED MANAGEMENT GROUP

Coordinated Integrated Monitoring Program (CIMP)

Submitted by:

CITY OF SANTA CLARITA

COUNTY OF LOS ANGELES

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

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List of Acronyms

BMP	Best Management Practice
BPA	Basin Plan Amendment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFS	Cubic Feet per Second
CIMP	Coordinated Integrated Monitoring Program
CRAM	California Rapid Assessment Method
CWA	Clean Water Act
DDT	Dichloro-diphenyl-trichloroethane
DO	Dissolved Oxygen
EIA	Effective Impervious Area
EO	Executive Officer
GIS	Geographic Information System
HUC	Hydrologic Unit Code
IC/ID	Illicit Connection/Illicit Discharge
IMP	Integrated Monitoring Program
LA	Los Angeles
LACDPW	Los Angeles County Department of Public Works
LACFCD	Los Angeles County Flood Control District
LARWQCB	Los Angeles Regional Water Quality Control Board
LTA	Long Term Assessment
MAL	Municipal Action Level
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System
NAL	Non-Stormwater Action Level
NPDES	National Pollutant Discharge Elimination System
NSW	Non-Stormwater
OC	Organochlorine
RAA	Reasonable Assurance Analysis
RW	Receiving Water
RWL	Receiving Water Limitation
SCCWRP	Southern California Coastal Water Research Project

SCR	Santa Clara River
SMC	Stormwater Monitoring Coalition
SQO	Sediment Quality Objectives
SSA	Special Study Assessment
SSC	Suspended Sediment Concentration
SW	Stormwater
TDS	Total Dissolved Solids
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total Suspended Solids
USCRWMG	Upper Santa Clara River Watershed Management Group
USEPA	United States Environmental Protection Agency
WBPC	Water Body-Pollutant Combination
WLA	Waste Load Allocation
WMA	Watershed Management Area
WQBEL	Water Quality Based Effluent Limitation
WQS	Water Quality Standard

Executive Summary

This Coordinated Integrated Monitoring Program (CIMP) document is a part of compliance with the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit Order No. R4-2012-0175 (Permit), which was adopted on November 8, 2012 by the Los Angeles (LA) Regional Water Quality Control Board (Regional Board or LARWQCB) and became effective December 28, 2012. Geographically, the CIMP covers the portion of the Upper Santa Clara River in Los Angeles County and the City of Santa Clarita that is regulated by the Permit (**Figure ES- 1**). This area encompasses approximately 121,423 acres. The entire Santa Clara River watershed is approximately 1,634 square miles that drains into the Santa Clara River, flowing from Los Angeles County, through Ventura County, and terminating at the Pacific Ocean between the cities of Ventura and Oxnard. Nearly ninety percent of the watershed is open space with approximately eighty-eight percent being undeveloped raw land.

Included in the Permit are requirements for a Monitoring and Reporting Program (MRP). The MRP specifications are listed in **Attachment E** to the Permit. The stated Primary Objectives for the MRP are listed in Part II.A.1 of the MRP, as follows:

1. Assess the chemical, physical, and biological impacts of discharges from the MS4 on receiving waters.
2. Assess compliance with receiving water limitations (RWLs) and water quality-based effluent limitations (WQBELs) established to implement Total Maximum Daily Load (TMDL) wet weather and dry weather waste load allocations (WLAs).
3. Characterize pollutant loads in MS4 discharges.
4. Identify sources of pollutants in MS4 discharges.
5. Measure and improve the effectiveness of pollutant controls implemented under the Permit.

Per the Permit, the Permittees have the option to develop a CIMP in lieu of the generic MRP as original written in the Permit. The CIMP offers the option to utilize alternative approaches to meet the Primary Objectives, if sufficient justification is provided. The CIMP will be designed to provide the information necessary to guide management decisions in addition to providing a means to measure compliance with the Permit and is composed of five elements:

1. Receiving Water Monitoring
2. Storm Water (SW) Outfall Monitoring
3. Non-Storm Water (NSW) Outfall Monitoring
4. Optional Special Studies
5. New Development/Redevelopment Effectiveness Tracking
6. Regional Studies

The CIMP provides a detailed discussion of the monitoring approaches for each element. The Attachments to the CIMP describe additional background information and detail specific analytical and monitoring procedures that will be used to comply with the specific MRP requirements. The monitoring program is summarized below and **Table ES- 1**provides an overview of the constituents and monitoring frequency at each monitoring location.

Site Selection:

1. The current mass emission station will be maintained as a receiving water monitoring location (SNTCLR_6_ME) to determine if RWLs are achieved, assess trends in pollutant concentrations over time, and determine whether designated uses are supported. In addition, the mass emission station will be used to meet TMDL monitoring requirements and evaluate attainment of or progress in attaining applicable TMDLs.
2. Two TMDL receiving water monitoring locations (Reach 5 and Reach 7) are also included. TMDL monitoring locations are intended to meet TMDL monitoring requirements and evaluate attainment of or progress in attaining the TMDL. Additionally constituents exceeding RWLs in the applicable reach will also be monitored at these locations.
3. Six stormwater outfall monitoring locations, approximately one per HUC-12, determined to be representative of the land uses and characteristics of the EWMP area.
4. One stormwater outfall monitoring location at Lake Elizabeth to identify whether or not the MS4 contributes to the lake's 303(d) listing for eutrophic conditions.
5. Six non-stormwater (NSW) TMDL outfall monitoring locations for TMDL compliance that correspond with the previously mentioned 6 stormwater outfall monitoring locations.
6. NSW outfall monitoring sites to be determined through the NSW outfall screening and source identification process required by the permit.

Parameters to be Collected:

1. Parameters were determined based on the constituents required in the MRP and the water quality prioritization process specific to each reach.
2. For the mass emission receiving water location, all constituents required to be monitored in the MRP will be collected except those that have not been detected in the past 10 years based on the evaluation conducted during the water quality prioritization.
3. Constituents identified as on the 303(d) list or exceeding water quality objectives during the water quality prioritization process will be monitored at the TMDL receiving water monitoring location in the reach where the listing exists or the exceedances were observed.
4. All constituents identified in a TMDL monitoring requirement will be monitored at the TMDL monitoring locations.

Monitoring Frequency

1. Monitoring frequency of three wet weather events and two dry weather events per year in the receiving waters with corresponding three wet weather events at the stormwater outfall sites and two dry weather events at the NSW outfall sites.
2. For constituents that are being monitored due to identification through the water quality priority process as having observed exceedances in the receiving water, the monitoring will be reduced or eliminated if continued exceedances are not observed within two years. If needed, the monitoring of 303(d) listed constituents may continue to support de-listing.

Other Elements

1. NSW outfall screening, prioritization, and source identification approach.
2. Commitment to participation in the SMC bioassessment monitoring program.
3. Optional special study monitoring to evaluate sources of pyrethroids in Bouquet Canyon and contributions of bacteria from undeveloped open space.
4. New development/redevelopment tracking procedures
5. Reporting and compliance evaluation procedures

In addition, the CIMP outlines an adaptive management process that describes the procedures that will be used to evaluate data gathered through the CIMP and modify the monitoring program in response to the results.

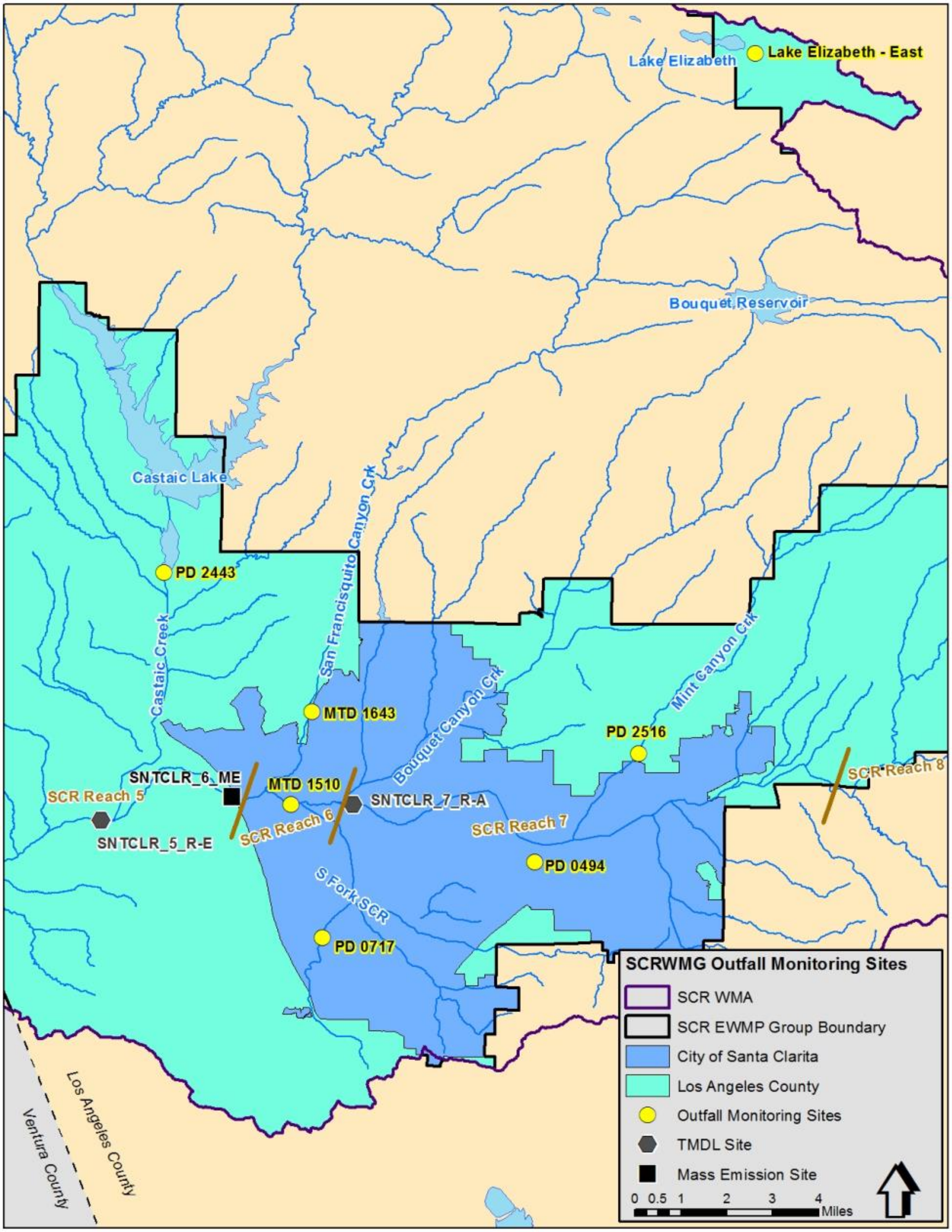

Figure ES- 1. Receiving Water and Outfall Monitoring Sites for USCRWMG

Table ES- 1. Summary of Proposed Monitoring Program for USCRWMG

Constituent	Annual Frequency (number wet events/number dry events)												
	Santa Clara River												Lake Elizabeth
	Reach 5				Reach 6					Reach 7			
	SNTCLR_5_RE [1]	Salt Canyon HUC-12 [1,2]	Lower Castaic Creek HUC-12[1,2]	Significant NSW Outfalls[3]	SNCLR_6_ME [1]	San Francisquito Canyon HUC-12[1,2]	South Fork Santa Clara River HUC-12[1,2]	Sand Canyon HUC-12[1,2]	Significant NSW Outfalls[3]	SNTCLR_7_R-A[1]	Mint Canyon HUC-12[1,2]	Significant NSW Outfalls[3]	Lake Elizabeth East [10]
Flow and field parameters[4]	3/2	3/2	3/2	2	3/2	3/2	3/2	3/2	2	3/2	3/2	2	3/2
Pollutants identified in Table E-2 of the MRP[5]					1[6]/1[6]								
Aquatic Toxicity[13]	[12]				2/1					[12]			
TSS and Hardness	3/2	3	3	2	3/2	3	3	3	2	3/2	3	2	
Ammonia	3/2	3/2	3/2	2	3/2	3/2	3/2	3/2	2	3	3/2	2	3/2
Nitrate-Nitrogen	3/2	3/2	3/2	2	3/2	3/2	3/2	3/2	2	3	3/2	2	3/2
Nitrite-Nitrogen	3/2	3/2	3/2	2	3/2	3/2	3/2	3/2	2	3	3/2	2	3/2
Chloride	3/2	3/2	3/2	2	3/2	3/2	3/2	3/2	2	3/2	3/2	2	
TDS	3/2	3	3	2									
E. coli (Bacteria TMDL)	3/2[7]	3/2	3/2	2	3/2[7]	3/2	3/2	3/2	2	3/2[7]	3/2[7]	2	
Copper	3/2	3	3	2	3/2	3	3	3	2	3/2	3	2	
Iron	3/2	3	3	2	3/2	3	3	3	2				
Mercury	3/2	3	3	2	3/2	3	3	3	2	3/2	3	2	
Selenium					3/2	3	3	3	2				
Zinc					3/2	3	3	3	2				
Total Kjeldahl Nitrogen or Organic Nitrogen													3/2

Constituent	Annual Frequency (number wet events/number dry events)												
	Santa Clara River												Lake Elizabeth
	Reach 5				Reach 6					Reach 7			
	SNTCLR_5_RE [1]	Salt Canyon HUC-12 [1,2]	Lower Castaic Creek HUC-12[1,2]	Significant NSW Outfalls[3]	SNCLR_6_ME [1]	San Francisquito Canyon HUC-12[1,2]	South Fork Santa Clara River HUC-12[1,2]	Sand Canyon HUC-12[1,2]	Significant NSW Outfalls[3]	SNTCLR_7_R-A[1]	Mint Canyon HUC-12[1,2]	Significant NSW Outfalls[3]	Lake Elizabeth East [10]
Orthophosphate-Phosphorus													3/2
Total Phosphorus													3/2
Cyanide[8]					3/2	3	3	3	2	3/2	3	2	
Bis (2-ethylhexyl) Phthalate[9]					1/1[6]								
Chlorpyrifos[11]					1/1[6]								
Diazinon[11]					1/1[6]								

1. Annual frequency listed as 3/2 signifies the number of wet-weather events per year/number of dry-weather events per year.
2. Boxes with a monitoring frequency listed as 3 are for wet weather only.
3. Significant NSW monitoring locations will be determined after outfall screening and source identification. Monitoring frequency shown is for dry weather only.
4. Field parameters are defined as DO, pH, temperature, and specific conductivity.
5. Attachment C lists the parameters from Table E-2 that will be monitored at this site. An analysis has been conducted to determine which Permit Required Pollutants should not be monitored during the first year due to previously collected monitoring results indicating that the Permit Required Pollutant hasn't been detected in any reach in the EWMP area.
6. Monitoring frequency only applies during the first year of monitoring. For pollutants that are not detected at the Method Detection Limit for its respective test method or the result is below the lowest applicable water quality objective, additional monitoring will not be conducted (i.e., the monitoring frequency will become 0/0). For pollutants that are detected above the lowest applicable water quality objective, additional monitoring will be conducted for the condition under which the exceedance occurred (wet or dry), at the frequency specified in the MRP (i.e., the monitoring frequency will become 3 for a wet weather exceedance, 2 for a dry weather exceedance, or 3/2 for exceedances during both event types) beginning the next monitoring year.
7. This will be the initial monitoring frequency for this permit term. The monitoring frequency will change to weekly at a time to be determined during EWMP development to correspond with milestones developed for compliance with the Bacteria TMDL when comparison to the geometric mean is needed.
8. Cyanide is likely to be from POTW discharges, as it is unlikely to have MS4 sources, it may be removed if the MS4 is determined not to be a source.
9. Bis (2-ethylhexyl)Phthalate is not suspected to have MS4 sources. Additionally, no exceedances have been observed in the past 5 years.
10. Lake Elizabeth outfall site will be sampled for one year to identify whether or not the MS4 contributes to the lake's 303(d) listing for eutrophic conditions. The results will then be evaluated to determine whether monitoring shall continue.
11. Sufficient monitoring data is available to support 303(d) delisting of this constituent and no exceedances have occurred in the past 5 years. A summary of the available monitoring data supporting the delisting is presented in Attachment A. If exceedances of this constituent occur during the first year of monitoring at the receiving water site, outfall monitoring will commence during the next monitoring year for sites within Reach 6 for the condition under which the exceedance occurred (wet or dry weather).

12. If the toxicity test results at receiving water site SNCLR_6_ME exceed the toxicity identification evaluation (TIE) thresholds and the results are inconclusive, toxicity testing will commence at the upstream (SNTCLR_7_RA) and downstream (SNCLR_5_RE) receiving water sites for the condition under which the TIE trigger occurred (wet weather or dry weather). Should no toxicity occur at the reach 5 or reach 7 receiving water sites, toxicity testing will cease at both or either location (wherever the TIE threshold was not met). If toxicity at the reach 5 or 7 receiving water sites meets the TIE threshold, a TIE will be conducted and will follow the process outlined in Figure 6 starting with the "Conduct TIE" box in the flow chart.
13. Aquatic toxicity outfall monitoring will follow the process outlined in Section 7.3, additional details may be found in Attachment F.

1 Introduction

This Coordinated Integrated Monitoring Program (CIMP) for the Santa Clara River Watershed Management Group is part of compliance with the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. R4-2012-0175 (Permit), which was adopted November 8, 2012 by the Los Angeles Regional Water Quality Control Board (Regional Board) and became effective December 28, 2012. The geographic scope of this monitoring program is the portion of the Upper Santa Clara River in Los Angeles County and the City of Santa Clarita that is regulated by the Permit (**Figure 1**), which is approximately 121,423 acres. This excludes state and federal lands, such as the Angeles National Forest and the state parks lands. The entire Santa Clara River Watershed is 1,634 square miles that drains into the Santa Clara River, one of the last remaining natural rivers in Southern California. Nearly ninety percent of the watershed is open space. At approximately 100 miles long, the Santa Clara River originates in the northern slopes of the San Gabriel Mountains in Los Angeles County, continuing west through Ventura County, and entering the Pacific Ocean between the cities of Ventura and Oxnard.

Flows in Santa Clara River reaches that pass through the CIMP area are predominantly storm water runoff during wet weather months and water reclamation plant effluent discharges in the drier months. In years of significant rainfall, ephemeral springs and year round flows exist in some tributaries and natural upstream areas. Dry season flows tend to percolate into the subsurface in the vicinity of Lang Station Road. The Valencia and Saugus Water Reclamation Plants' effluent tends to seep underground near Castaic Creek. These flows resurface further west near Torrey Road. While effluent volumes remain relatively consistent, their proportional contribution to flow in the river is greater during dry conditions.

Most of the monitoring to date in the Upper Santa Clara River has been done related to impacts of water reclamation plant discharge. Mass emission station monitoring in Reach 6 provided the basis of MS4 monitoring during previous permit cycles. This CIMP greatly expands upon previous efforts to achieve the monitoring goals in the Permit. Additionally, the CIMP fulfills all MS4 monitoring requirements for effective TMDLs within the EWMP area.

The purpose of the Permit is to ensure the MS4s in Los Angeles County are not causing or contributing to exceedances of water quality objectives set to protect the beneficial uses in the receiving waters. Included as **Attachment E** to the Permit are requirements for a Monitoring and Reporting Program (MRP). The stated Primary Objectives for the MRP, listed in Part II.A.1 of the MRP, as follows:

1. Assess the chemical, physical, and biological impacts of discharges from the MS4 on receiving waters.
2. Assess compliance with receiving water limitations (RWL) and water quality-based effluent limitations (WQBELs) established to implement Total Maximum Daily Load (TMDL) wet weather and dry weather wasteload allocations (WLAs).
3. Characterize pollutant loads in MS4 discharges.
4. Identify sources of pollutants in MS4 discharges.
5. Measure and improve the effectiveness of pollutant controls implemented under the Permit.

Extensive default monitoring requirements are specified in the MRP. However, Permittees have the option to develop a Coordinated Integrated Monitoring Program (CIMP) that may be used to specify alternative approaches for meeting the Primary Objectives. The Permittees in the USCR EWMP area have selected to implement a CIMP. This document provides a discussion of the monitoring locations (Section 4), monitoring frequency (Section 5), constituents (Section 1), and general monitoring approach (Section 7). Section 8 details the non-stormwater screening program and Section 9 outlines the other required components of the MRP. Details of the monitoring protocols are included in Attachment F.

2 Upper Santa Clara River Enhanced Watershed Management Plan Area

The City of Santa Clarita, County of Los Angeles and County of Los Angeles Flood Control District comprise the Upper Santa Clara River Watershed Management Group (USCRWMG or Group Members). The USCRWMG is addressing MS4 water quality issues through an Enhanced Watershed Management Plan (EWMP) and CIMP process. The USCRWMG EWMP area is displayed on **Figure 1** along with the named water bodies. Jurisdictional size and land uses are listed in **Table 1**.

Table 1. List of Group Members Participating in the EWMP with Land Use Summaries

		Percent of Jurisdiction(1)			
Jurisdiction	**Area (sq.mi.)**	**Res**	**Com/Ind**	**Ag/Nur**	**Open**
County of Los Angeles	363.7	11%	7%	2%	80%
Santa Clarita	61.7	33%	16%	1%	50%
County of Los Angeles Flood Control District	0	N/A	N/A	N/A	N/A
All Group Members	425.4	14%	8%	2%	76%

1. Land use classifications include: residential (Res), commercial and industrial (Com/Ind), agriculture and nursery (Ag/Nur), and open space (Open). Totals correspond to the percent of the total area considered in the EWMP

Additional background information for the EWMP area is presented in **Attachment A**.

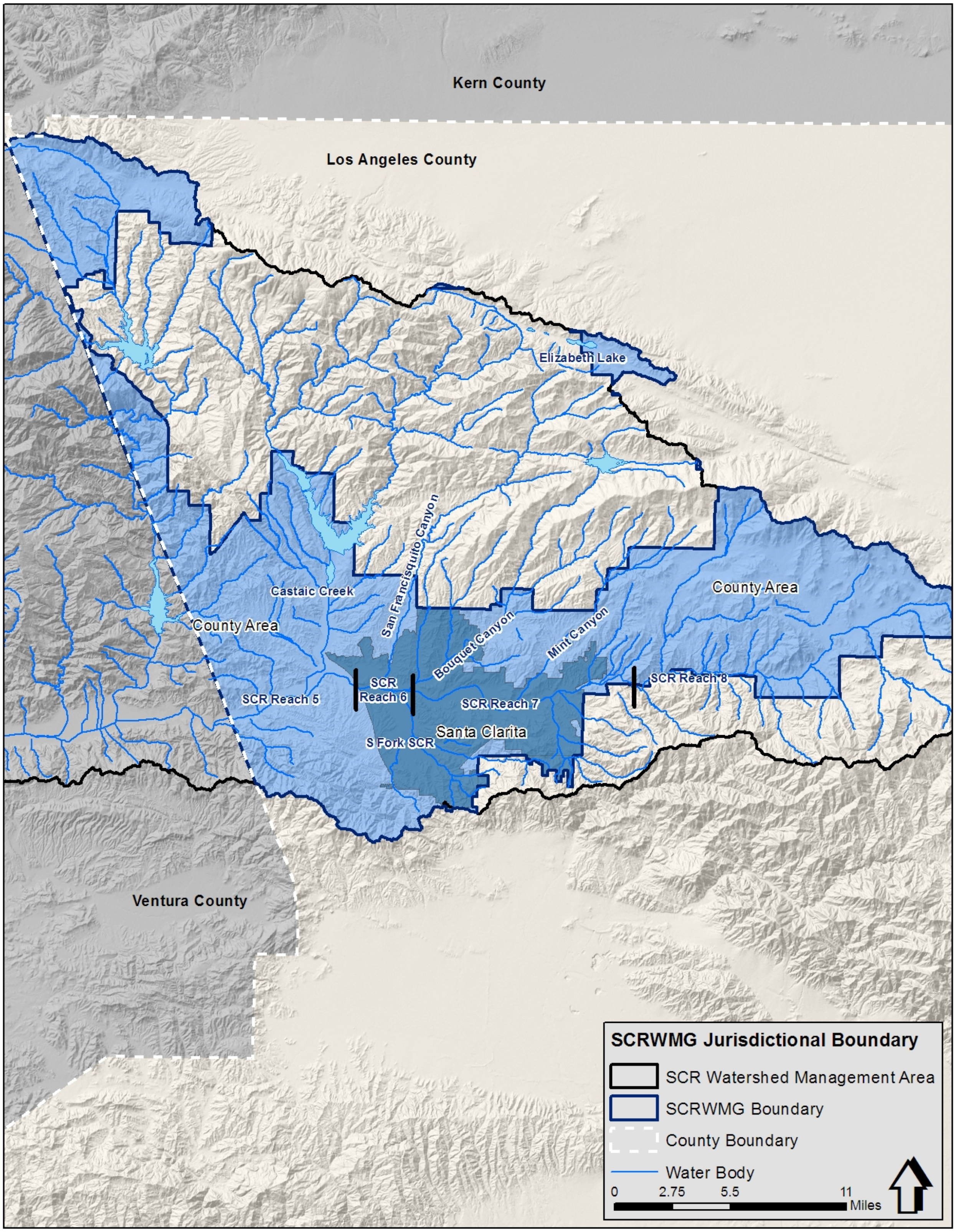

Figure 1. Water Bodies and Geographic Boundary of the USCRWMG

2.1 TMDLS

There are four Total Maximum Daily Loads (TMDLs) currently effective within the EWMP area. **Table 2** lists the schedule and applicable interim and final Water Quality Based Effluent Limitations (WQBELs) and all other final WQBELs and receiving water limitations (RWLs) established by TMDLs and identified in Attachment L of the Permit.

Table 2. Summary of TMDLs for the USCR EWMP

TMDL	Waterbody	Constituent	Weather Condition	Schedule							Final WQBEL
				2012	2013	2014	2015	2016	2023	2029	
Salts	Santa Clara River Reaches 5, 6[2]	Chloride	Dry	Final[1]							100 mg/L
Bacteria	Santa Clara River Reaches 5, 6, 7	E. coli	Dry					Interim[4]	Final		235 MPN/ 100mL daily max, 126 MPN/100mL geo mean WQBEL, 5 exceedance days daily max, 126 geo mean RWL
			Wet					Interim[5]		Final	235 MPN/ 100mL daily max, 126 MPN/100mL geo mean WQBEL, 16 exceedance days daily max, 126 geo mean RWL
Nutrients	Santa Clara River Reaches 5[3]	Ammonia		Final[1]							1-hr average 5.2 mg/L 30 day average 1.75 mg/L
		Nitrate and Nitrite		Final[1]							30 day average 6.8 mg/L
Trash	Lake Elizabeth	Trash		Interim[6]	Interim[6]	Interim[6]	Interim[6]	Final			100% Full Capture

1. Final applicable on Effective Date of Permit.
2. TMDL applies to Reaches 4B, 5, 6, and 7, but permit only includes WQBELs for Reaches 5 and 6.
3. TMDL includes load allocations and monitoring requirements for other reaches, but wasteload allocations and WQBELs only apply to Reach 5.
4. Interim RWL of 17 allowable exceedance days.
5. Interim RWL of 61 allowable exceedance days.
6. Interim limits: 20% full capture in 2012, 40% full capture in 2013, 60% full capture in 2014, 80% full capture in 2015.

2.2 EXISTING WATERSHED MONITORING PROGRAMS

Existing watershed monitoring programs provide historical data and information that can be used to support site selection and identification of constituents for monitoring. There are two existing monitoring programs and two proposed monitoring programs in the watershed that monitor in the main stem of the Santa Clara River. Other discharger specific monitoring programs exist in the watershed, but they do not contain monitoring in the main stem of the Santa Clara River. The existing watershed monitoring programs include:

- MS4 Permit Monitoring (Mass Emission Monitoring)
- County Sanitation Districts of Los Angeles County (LACSD) Monitoring
- Proposed Watershed-wide Monitoring program[1]
- Proposed Comprehensive Water Quality Monitoring Plan[2]
- Proposed Newhall Ranch Specific Plan Water Quality Monitoring Plan

As part of implementation of the CIMP, opportunities to coordinate with the existing or proposed monitoring efforts will be explored. The CIMP is written to outline the monitoring requirements to assess the USCRWMG MS4 requirements. Coordination with other monitoring programs may occur in the future, where data from other programs may be used to fulfill USCRWMG monitoring requirements.

3 Monitoring Program Elements and Objectives

The primary purpose of this CIMP document is to outline the process for collecting data to meet the goals and requirements of the MRP. The CIMP provides information on sample collection and analysis methodologies relevant to both categories of monitoring. The CIMP is designed to provide the EWMP Group the information necessary to guide water quality program management decisions. Additionally, the monitoring will provide a means to measure compliance with the Permit. The CIMP is composed of five elements, including:

1. Receiving Water Monitoring
2. Stormwater Outfall Monitoring
3. Non-Stormwater Outfall Monitoring
4. New Development/Redevelopment Effectiveness Tracking
5. Regional Studies

An overview of each of the monitoring types and their monitoring objectives are described in the following subsections. Specifics regarding each monitoring element including monitoring locations, frequency, parameters, and procedures are provided in the subsequent sections.

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[1] The *Santa Clara River Watershed-wide Monitoring Program and Implementation Plan* (SCR Watershed-wide Monitoring Program), dated December 15, 2011 has not yet been implemented.

[2] 2006 Comprehensive Water Quality Monitoring Plan for the Santa Clara River Watershed was initiated in November 2003 by the Ventura County Watershed Protection District (VCWPD)

3.2 RECEIVING WATER MONITORING

The objectives of receiving water monitoring include the following:

- Determine whether the receiving water limitations are being achieved;
- Assess trends in pollutant concentrations over time, or during specified conditions; and
- Determine whether the designated beneficial uses are fully supported as determined by water chemistry, as well as aquatic toxicity and bioassessment monitoring.

The receiving water monitoring approach will provide data to determine whether the RWLs and water quality objectives are being achieved in the Santa Clara River. Over time, the monitoring will allow the assessment of trends in pollutant concentrations. Receiving water monitoring consists of the mass emission receiving water site designed to meet all receiving water permit requirements and additional TMDL monitoring locations necessary to evaluate TMDL requirements and 303(d) listings.

3.3 STORMWATER OUTFALL MONITORING

MS4 stormwater outfall monitoring supports three permit objectives, including:

- Determine the quality of stormwater discharge relative to municipal action levels.
- Determine whether stormwater discharge is in compliance with applicable stormwater WQBELs derived from TMDL WLAs.
- Determine whether the discharge causes or contributes to an exceedance of receiving water limitations.

The stormwater outfall monitoring program is designed to characterize stormwater discharges from MS4s at representative outfall locations within the EWMP area. Six stormwater outfall monitoring locations have been selected for the EWMP area.

3.4 NON-STORMWATER OUTFALL PROGRAM

Objectives of the non-stormwater (NSW) outfall monitoring include the following:

- Determine whether a discharge is in compliance with applicable non-stormwater WQBELs derived from TMDL WLAs.
- Determine whether a discharge exceeds non-stormwater action levels.
- Determine whether a discharge contributes to or causes an exceedance of receiving water limitations.
- Assist in identifying illicit discharges.

The Non-Stormwater Outfall Screening and Monitoring Program is focused on dry weather discharges to receiving waters from major outfalls. The program fills two roles, the first is to provide data to allow determination of whether the non-stormwater constituent load is adversely impacting the receiving water, and the second is to assess the permit requirement to effectively prohibit NSW discharges.

To fulfill these two roles, two elements of the NSW program have been defined. The first is non-stormwater TMDL outfall monitoring at set monitoring locations to assess compliance with non-stormwater WQBELs and the potential for a discharge to contribute to or cause a RWL exceedance. This type of sampling will occur at the stormwater outfall monitoring sites.[3] The second element is the non-stormwater screening program. The non-stormwater screening program is designed to be complimentary to the Illicit Connection/Illicit Discharge (IC/ID) minimum control measure (MCM). As outlined in the screening program included in Section 8, a potential outcome of the screening process is the identification of non-stormwater monitoring locations. If non-stormwater monitoring locations are identified, the sites will be monitored as part of the non-stormwater outfall monitoring program.

3.5 NEW DEVELOPMENT/REDEVELOPMENT EFFECTIVENESS TRACKING

Participating agencies have developed mechanisms for tracking new development/re-development projects that have been conditioned for post-construction BMPs pursuant to MS4 Permit Part VI.D.7. Agencies have also developed mechanisms for tracking the effectiveness of these BMPs pursuant to MS4 Permit Attachment E.X.

3.6 REGIONAL STUDIES

Only one regional study is identified in the MRP: Southern California Stormwater Monitoring Coalition (SMC). The Southern California SMC is a collaborative effort between all of the Phase I MS4 NPDES Permittees and NPDES regulatory agencies in Southern California. The Southern California Coastal Water Research Project (SCCWRP) oversees the SMC. The Los Angeles County Flood Control District will participate in the SMC Regional Program on behalf of the USCRWMG to meet this permit requirement.

3.7 OPTIONAL SPECIAL STUDIES

Two optional special studies have been identified. The special studies will be conducted if needed to answer specific questions. Additional special studies may be conducted if localized water quality concerns are identified through the CIMP and EWMP process, helping the USCRWMG better implement the EWMP.

For each of these optional monitoring elements, the applicable monitoring locations, parameters and monitoring methods are described in **Attachment F**.

4 Monitoring Locations

The CIMP monitoring locations consist of receiving water and outfall monitoring locations. Monitoring locations have been identified to achieve the monitoring objectives.

[3] Non-stormwater TMDL outfall monitoring sites are currently set at the stormwater outfall locations. The USCRWMG may modify these sites based on the NSW screening process if more appropriate site locations are determined.

4.1 RECEIVING WATER MONITORING SITES

The requirements in the MRP include receiving water monitoring sites at previously designated mass emission stations, TMDL receiving water compliance points, and additional receiving water locations representative of the impacts from MS4 discharges. To meet these requirements, two types of monitoring locations are included in the CIMP.

- **Mass Emission Receiving Water –** The mass emission receiving water (ME) monitoring location is intended to determine if RWLs are achieved, assess trends in pollutant concentrations over time, and determine whether designated uses are supported.
- **TMDL Receiving Water–** TMDL receiving water monitoring locations (TMDL) were selected to evaluate attainment of, or progress in attaining the TMDL, and support evaluating the status of 303(d) listings and other RWL exceedances specific to other reaches in the watershed.

While not explicitly established in the MRP, the monitoring types proposed distinguish between the different end goals of monitoring for specific constituents within specific water bodies in the EWMP area. ME monitoring provides a long-term record to understand conditions within the EWMP area, for a robust suite of parameters. TMDL monitoring addresses TMDL related constituents and provide monitoring locations to assess other identified exceedances of RWLs determined through an analysis of existing data.

4.1.1 Mass Emission Receiving Water Site

One of the primary objectives of receiving water monitoring is to assess trends in pollutant concentrations over time, or during specified conditions. As a result, the primary characteristic of an ideal receiving water assessment monitoring site is a robust dataset of previously collected monitoring results so that trends in pollutant concentrations over time, or during specified conditions, can be assessed.

The Santa Clara MS4 Mass Emission Station, S29, will provide representative measurement of the effects of the MS4 discharges on the receiving water for the upper portion of the watershed, which is covered by the EWMP area. The location of the proposed ME monitoring site can be seen on **Figure 2**. Photographs of the ME site and flow monitoring locations for the ME site are included in **Attachment B**.

4.1.2 TMDL Sites

Within the EWMP area, TMDL monitoring sites are required in SCR Reaches 5, 6, and 7 to meet the requirements of the Bacteria TMDL. In addition, Part C of Attachment L to the Permit specifies WQBELs for the County of Los Angeles' discharges to Elizabeth Lake for the trash TMDL. The County of Los Angeles has installed six full capture devices to achieve the final WQBELs as such, per the requirements of the Elizabeth Lake Trash TMDL, a monitoring site within Elizabeth Lake is not required. **Attachment A, Section 3.3**, provides information related to the six full capture devices installed in the Elizabeth Lake watershed and a figure depicting the location of the full capture devices.

Given the Bacteria TMDL has the most stringent monitoring requirements, the in-stream site selection has been centered on meeting the requirements of the Bacteria TMDL. The Bacteria TMDL requires at least one monitoring location per impaired reach. As this CIMP details the monitoring to be conducted within the USCRWMG EWMP area and not the downstream reaches, Reaches 5, 6, and 7 will each have one monitoring location. **Table 3** lists the TMDL monitoring sites and **Attachment B** provides a summary of the monitoring locations and associated attributes. As the monitoring locations are situated upstream of one another, their drainage areas overlap, so each monitoring location's drainage area includes the drainage areas for all upstream monitoring locations. For example, the drainage area for SNTCLR_6_ME contains the area outlined for that site, plus the drainage areas for SNTCLR_7_R-A. The proposed sites are shown on **Figure 2**. Photographs of the TMDL sites are included in **Attachment B**.

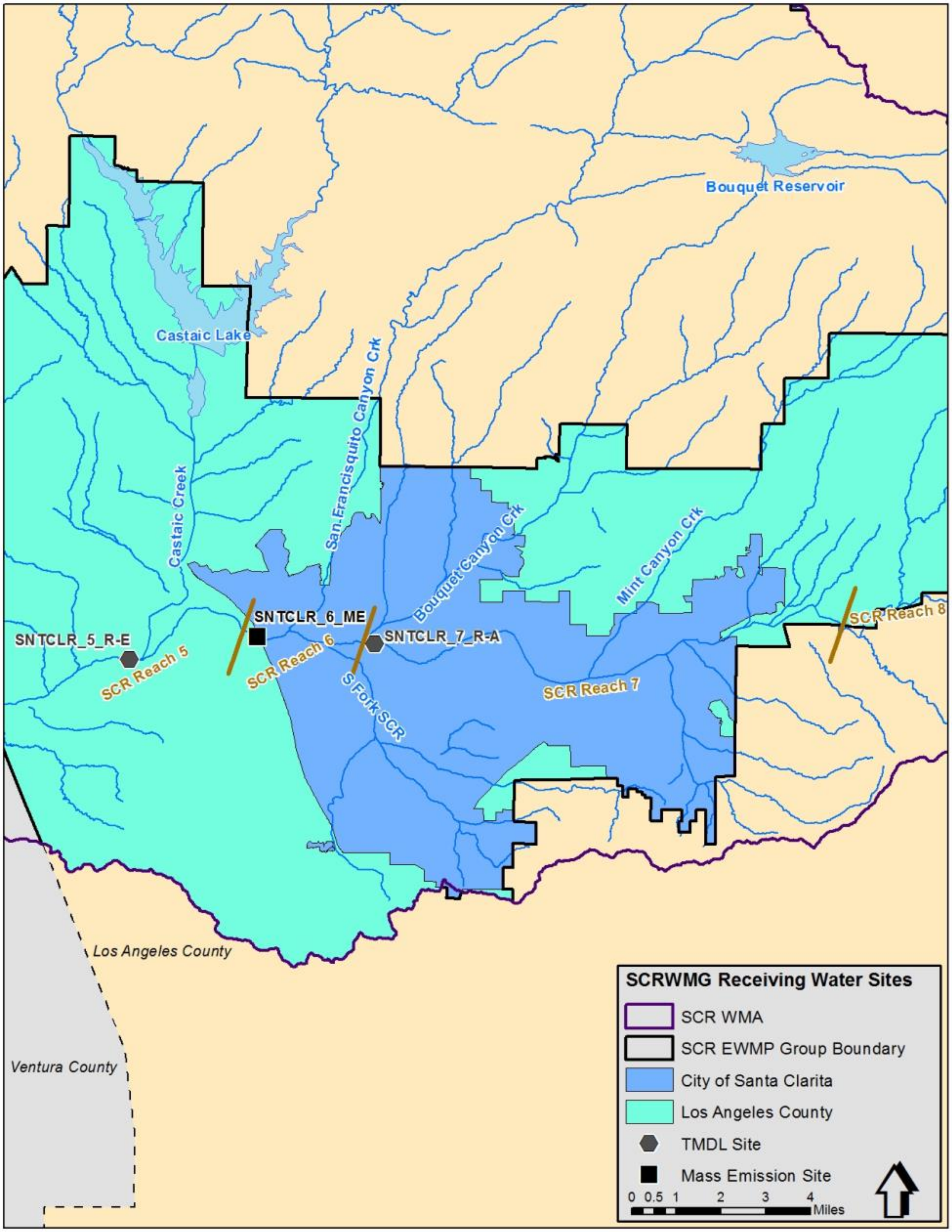

Figure 2. Overview of Receiving Water Monitoring Sites

Table 3. Summary of USCRWMG Receiving Water Monitoring Sites

Site ID	Water Body	Coordinates		Monitoring Type	
		Latitude	Longitude	ME	TMDL
SNTCLR_5_R-E	SCR Reach 5	34.41856	-118.63569		X
SNTCLR_6_ME	SCR Reach 6	34.42611	-118.58583	X	X
SNTCLR_7_R-A	SCR Reach 7	34.42403	-118.53956		X

4.2 STORMWATER OUTFALL MONITORING SITES

The permit requires the identification of monitoring locations for stormwater outfall monitoring. The outfall monitoring locations were selected as representative monitoring locations that discharge to each reach of the Santa Clara River. The primary criteria for the stormwater outfall monitoring program was selecting monitoring sites that are representative of the range of land uses in the permit area and provide accurate data for measuring flows and characterizing pollutant loads.

While the permit includes default requirements for one outfall site per jurisdiction per HUC-12, identification of alternative approaches are allowed as part of the CIMP development. The site selection process was utilized to identify sites that are representative based on land uses and characteristics of the development of the EWMP area.

The analysis was conducted by evaluating one outfall per HUC-12 with catchment land uses that were similar in characteristics to the HUC-12 in which it is located. To best compare the percent land uses within HUC-12 and the MS4 areas, in most cases, vacant land was not included in the calculation. HUC-12 outfall drainage percent land uses were calculated only using open space characterized as golf courses, local parks, and regional parks for site selection (open space).[4] However, for several of the HUC-12s, open space characterized as vacant with limited improvements or no improvements and undeveloped land makes up a significant portion of the total drainage area. As a result, most of the outfall drainages also include a portion of undeveloped land as it was not possible to identify any stormwater outfall sites without a large amount of undeveloped land in some HUC-12s.

Once potential outfalls were identified with representative land uses, the sites were field checked to ensure that it was safe and possible to monitor at the location. Potential sites were evaluated to consider the jurisdiction draining to the site, the ultimate receiving water for the site, and the characteristics of the drainage area (e.g. primarily newer development built to SUSMP standards or primarily pre-SUSMP development). Based on the site selection process, six outfalls were selected as representative of the seven HUC-12s that have major MS4 outfalls for the USCRWMG jurisdictions. Three of the six selected HUC-12 monitoring locations were determined to have similar percentages of the types of land uses. Two of the three outfalls with similar land uses were selected. The two sites were selected based on the fact that one primarily consists of newer development that has occurred since Standard Urban Stormwater Mitigation Program (SUSMP) requirements were implemented, and one representing older development

[4] All land uses were calculated using the 2005 SCAG land use layer.

prior to SUSMP implementation. The site selection approach is an appropriate monitoring approach for the USCR EWMP area due to the similar land uses between the two jurisdictions in the EWMP area. To enhance effectiveness, the City and County have agreed to work together to provide coordination as much as possible. Details of the outfall site selection process are provided in **Attachment D** to justify the selected approach. This site selection process took place during dry weather, field conditions may drastically differ during storm events. If representative samples cannot be collected or conditions are prohibitive of safe sampling at any of the outfall sites, an alternative previously evaluated site, within in the same HUC-12, will be used in subsequent events. The Regional Board will be notified of any monitoring site location changes in the Annual Report for the period when the change took place. Justification and any relevant documentation, such as field photos, will be included.

The seven selected outfall monitoring sites are presented in **Figure 3** and summarized in **Table 4**. Six of the outfall monitoring sites comprise the permit required stormwater outfall monitoring program, the seventh outfall discharging to Lake Elizabeth will be monitored solely for the determination of whether the MS4 contributes to the lake's 303(d) listing for eutrophic condition. Monitoring at the Lake Elizabeth outfall site will discontinue after a year, should the results indicate the MS4 is not contributing to the lake's eutrophic condition. A summary of the land use for each of the sites as compared to the HUC-12 land use is included in **Table 5**. Detailed maps and photographs of each of the stormwater outfall monitoring sites are included in **Attachment B.**

The selected sites are representative of the land uses within each respective HUC-12 as shown in **Table 5**. The data collected at the monitored outfalls will be representative of all MS4 discharge within the EWMP area. The resulting data will be applied to all Group Members represented by the site, regardless of whether a site is located within a particular jurisdiction or received flow from that land area. Compliance for Group Members with WQBELs and RWLs may be based on comingled discharges or data not collected within a given jurisdiction.

Table 4. Summary of Stormwater Outfall monitoring Sites in the USCRWMG's EWMP Area

HUC-12	Reach	Jurisdiction	Drain Name	Size	Shape	Material	Latitude	Longitude
Salt Canyon	Reach 5; Reach 6	City	MTD 1510	84"	Double Box	Reinforced Concrete Box	34.42398	-118.56321
San Francisquito Canyon	Reach 6	City	MTD 1643	78"	Round	Reinforced Conc. Pipe	34.45319	-118.55551
Sand Canyon	Reach 6; Reach 7	City	PD 0494	78"	Round	Reinforced Conc. Pipe	34.40604	-118.47007
S Fork Santa Clara River	Reach 6	City	PD 0717	120"	Square or Rectangle	Reinforced Concrete Box	34.38176	-118.55110
Lower Castaic Creek	Reach 5	County	PD 2443	60"	Square or Rectangle	Reinforced Conc. Box	34.49705	-118.61252
Mint Canyon	Reach 7	County	PD 2516	60"	Round	Corrugated Metal Pipe	34.44048	-118.43074
Lake Elizabeth [1]	N/A	County	Unknown (East)	30"	Round	Reinforced Conc. Pipe	34.66196	-118.38712

1.Lake Elizabeth outfall site will only be sampled to identify whether or not the MS4 contributes to the lake's 303(d) listing for eutrophic condition.

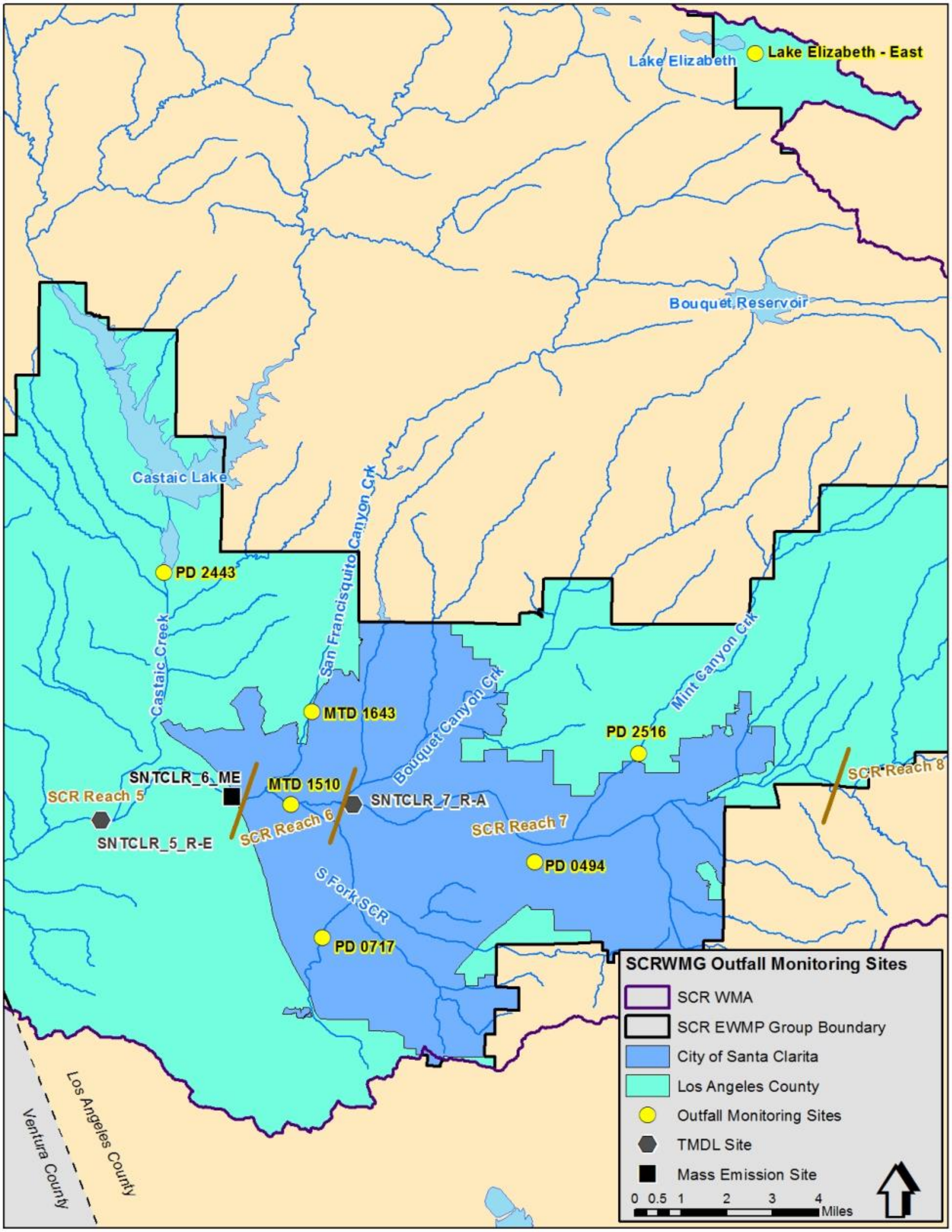

Figure 3. Receiving Water and Stormwater Outfall Monitoring Sites

Table 5. Outfall Monitoring Location Land Use Comparison [1]

	Land Use	Salt Canyon	San Francis-quito Canyon	Sand Canyon	S Fork Santa Clara River	Lower Castaic Creek	Mint Canyon
HUC-12	Residential	24%	82%	75%	58%	44%	78%
	Commercial	68%	13%	20%	35%	34%	21%
	Open	8%	5%	6%	8%	22%	1%
Outfall	Residential	57%	82%	88%	83%	45%	68%
	Commercial	41%	7%	11%	10%	37%	32%
	Open	2%	12%	0%	8%	18%	0%

1. Percentages calculated using only open space characterized as golf courses, local parks, and regional parks and not undeveloped.

4.3 NON-STORMWATER OUTFALL MONITORING SITES

As discussed in Section 3.4, the non-stormwater outfall monitoring serves two purposes. The first is to assess compliance with applicable non-stormwater WQBELs and assess whether the discharge contributes to or causes an exceedance of receiving water limitations. The second is to determine if non-stormwater discharges are being effectively prohibited.

4.3.1 Non-Stormwater TMDL Outfall Sites

The stormwater outfall monitoring sites identified in **Section 4.2** will be used as NSW TMDL outfall compliance monitoring locations.[5] Per the Bacteria TMDL, the outfall monitoring sites shall be "an adequate number of representative outfalls." These sites have been selected to be representative of the types of discharges observed in the EWMP area and to support the identification of control measures. Monitoring at these locations will be conducted to evaluate compliance with non-stormwater WQBELs and assess whether the discharge contributes to or causes an exceedance of receiving water limitations.

4.3.2 Significant Non-Stormwater Outfall Sites

As required by the permit, significant non-stormwater outfall monitoring locations may be identified through the non-stormwater screening program described in Section 8. As discussed in Section 8, after source investigations are conducted, the MRP requires monitoring for certain types of discharges. If significant NSW monitoring locations are identified through the screening process, monitoring will be conducted at those sites to assess whether the discharge

[5] The USCRWMG may modify the site locations for NSW TMDL outfall monitoring based on the results of the NSW screening process, if more appropriate sites are found.

exceeds non-stormwater action levels and whether the discharge contributes to or causes an exceedance of receiving water limitations.

4.4 OPTIONAL SPECIAL STUDY MONITORING LOCATIONS

Two optional special studies are identified in this CIMP. The first is the assessment of pyrethroids in Bouquet Canyon. For this study, two receiving water monitoring sites and one outfall monitoring site have been identified in Bouquet Canyon. The second optional study is the assessment of contributions of bacteria from undeveloped open space in Reach 7 of the Santa Clara River, upstream of the MS4 system. One receiving water monitoring location has been identified for this optional special study.

Monitoring at these locations may be conducted as a special study during the permit term. Monitoring at these locations, during this permit term, is optional and clearly distinct from the required monitoring conducted at the other monitoring locations.

Table 6. Summary of USCRWMG Optional Special Study Monitoring Sites

			Coordinates	
Site ID	**Special Study**	**Water Body**	**Latitude**	**Longitude**
SNTCLR_BC_SWAMP	Pyrethroids	Bouquet Canyon	34.42782	-118.54022
SNTCLR_BC_PARK	Pyrethroids	Bouquet Canyon	34.43267	-118.52596
PD 1256/ PD 1713	Pyrethroids	Lower Bouquet Canyon	34.45648	-118.53596
SNTCLR_7_FLG	Bacteria	SCR Reach 7	34.42972	-118.35444

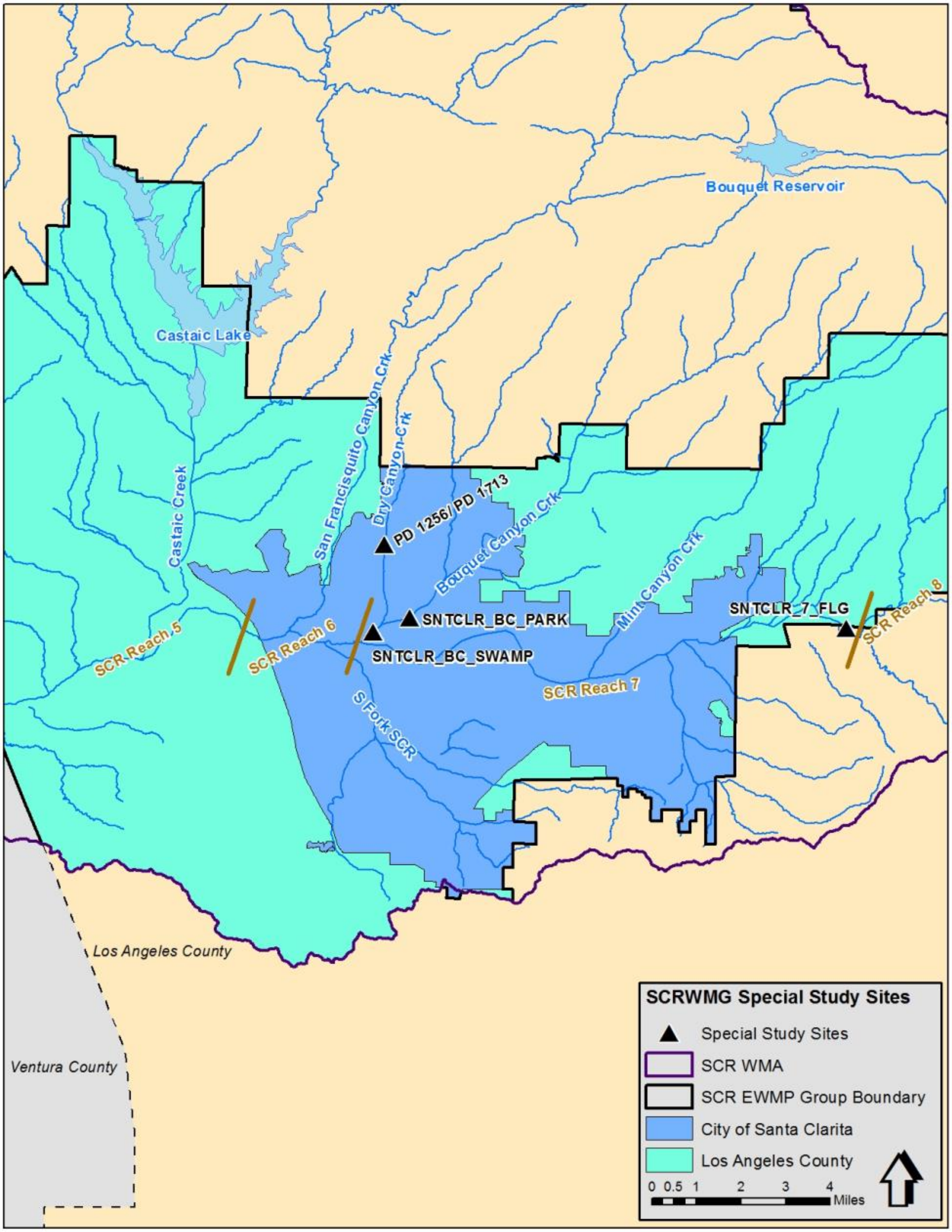

Figure 4. Optional Special Study Monitoring Locations

5 Monitoring Frequency and Schedule

The MRP clearly defines the minimum required frequency, and duration of receiving water and outfall monitoring. This section provides the proposed frequency of monitoring, monitoring schedule, and timing of sample collection for the CIMP.

5.1 MONITORING FREQUENCY

A general summary of the proposed CIMP monitoring frequency for receiving water and outfall monitoring is included in **Table 7**.

Table 7. Monitoring Frequency

Monitoring	Dry Frequency	Wet Frequency
Receiving water	2 [1]	3 [2]
Stormwater outfall		3
Non-stormwater TMDL outfall [4]	2 [3]	
Significant non-stormwater outfall	2 [3]	

1. Chronic toxicity to be monitored once per year during the historically driest month.
2. Acute toxicity to be monitored twice per year during wet weather.
3. The MRP specifies the following monitoring frequency for non-stormwater outfall monitoring as: (1) for outfalls subject to a dry weather TMDL, the monitoring frequency shall be per the approved TMDL monitoring plan or as otherwise specified in the TMDL or as specified in an approved CIMP or (2) for outfalls not subject to dry weather TMDLs, approximately quarterly for first year. The CIMP monitoring frequency will be two times per year to coordinate non-stormwater monitoring with receiving water monitoring. Per MRP section IX.G.5 of the Permit, after one year of monitoring, the Permittees may submit a written request to the EO to reduce or eliminate monitoring, following an evaluation of the data.
4. Not all outfall locations will be sampled during the first two years. Outfall sampling is being implemented using a phased approach with two outfalls monitored during the 1st year, an additional two outfalls the 2nd year, and all outfalls during the 3rd and subsequent year.

Sampling will occur at the monitoring frequency required by the Permit for receiving water and stormwater outfall monitoring. For non-stormwater outfall monitoring, the monitoring frequency will be reduced to two dry weather events per year. Stormwater and non-stormwater outfall monitoring will be conducted concurrently with receiving water monitoring to allow consideration of the potential impacts of the outfall discharges on the receiving waters.

While a monitoring frequency of quarterly is specified in the Permit for non-stormwater outfalls, it is inconsistent with the dry weather receiving water monitoring requirements. The receiving water monitoring requires two dry weather monitoring events per year. Additionally, during the term of the current Permit, outfalls will be screened three times (see Section 8) and those with significant non-stormwater discharges will be subject to a source investigation. As a result, monitoring non-stormwater outfalls twice per year will be sufficient to characterize non-stormwater discharges and will allow better coordination with the receiving water monitoring schedule.

The Bacteria TMDL requires that receiving water monitoring be conducted at a frequency “adequate to assess compliance with the 30-day geometric mean objectives.” Since the geometric mean objectives require a statistically sufficient number of samples [6] for calculation, weekly sampling is needed to meet this TMDL requirement. Since the geometric mean objectives are not required to be met until March 2023 for dry weather and March 2029 for wet weather and there are no interim geometric mean limits, weekly monitoring is not necessary during the initial implementation of the monitoring program. It is likely that the geometric mean objectives will continue to be exceeded during the implementation period and the additional cost of weekly bacteria monitoring would be significant. During the EWMP development, a schedule for weekly bacteria monitoring will be identified to coordinate with the interim milestones developed for bacteria TMDL compliance to ensure the interim milestones can be evaluated.

5.2 MONITORING SCHEDULE

Existing monitoring will continue to be conducted and beginning summer of 2014, the dry weather screening of major outfalls will commence. Implementation of new monitoring programs and modifications to existing monitoring programs will be implemented beginning July 2015 or 90 days after approval of the CIMP, whichever is later. Receiving water and stormwater outfall monitoring will be conducted per the CIMP for the first year. After the first year, modifications to the CIMP may be proposed, as outlined in the adaptive management process (Section 11). The stormwater outfall monitoring will follow a phased approach, with two outfalls being monitored the first year, an additional two outfalls the second year, and finally all outfalls the third year. The outfalls to be monitored the first year are MTD 1510 and MTD 1643, the two additional outfalls to be monitored during the second year are PD 0717 and PD 2443, and the three additional outfalls to be monitored during the third year are PD 0494, PD 2516, and Lake Elizabeth East.

Non-stormwater TMDL outfall monitoring will begin during the first dry weather receiving water monitoring event after July 1, 2015 or 90 days after CIMP approval by the EO, whichever is later. Monitoring at these sites will follow the same phased approach as specified for the stormwater outfall monitoring. NSW TMDL outfall samples will be collected at the same sites as those sampled during the stormwater outfall monitoring during any given monitoring year.

Significant non-stormwater outfalls may be identified through the non-stormwater screening process that will require monitoring. Per the permit, outfall monitoring at these locations should begin within 90 days of completing a source investigation or after the Executive Officer approves the CIMP, whichever is later in time. However, to allow for better coordination of monitoring events and to ensure corresponding receiving water data is available in conjunction with the outfall monitoring results, monitoring at any newly identified significant non-stormwater outfalls will begin during the next scheduled dry weather CIMP monitoring event or within 90 days of the completion of the source identification, whichever is later.

5.3 TIMING OF SAMPLE COLLECTION

The MRP includes specific criteria for the timing of monitoring events. Following is a summary of the specific timing requirements for sample collection based on the MRP requirements.

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[6] Statistically sufficient is generally not less than 5 samples equally spaced over a 30-day period per the Water Quality Control Plan: Los Angeles Region. Non-regulatory amendments to Chapter 3, Water Quality Objectives.

Dry weather samples will be collected on a day where there has been no measureable precipitation (<0.1 inches) in the past 72 hours. For dry weather toxicity monitoring, sampling must take place during the historically driest month. As a result, the dry weather monitoring event that includes toxicity monitoring will be conducted in August.

Wet weather sample collection will be triggered by the prediction of a storm of 1 inch or greater with a 70 percent probability of rainfall at least 24 hours prior to the event start time.[7] The permit requires collection of samples during the first storm event of the storm year with a predicted rainfall of at least 0.25 inch at a 70 percent probability of rainfall. However, the permit also states that wet weather is defined as when the flow within the receiving water is at least 20 percent greater than the base flow or an alternative threshold as provided for in an approved CIMP, or as defined by effective TMDLs within the watershed. As described in **Attachment F**, sufficient runoff to elevate the baseflow in the Santa Clara River requires significant amounts of rainfall (or high intensity rainfall). **Figure 5** depicts peak flow data correlated with rainfall at the Old Road Bridge Gaging Station located in Reach 5, which further supports the greater rainfall trigger. The USCR watershed has vast areas of undeveloped land and significant areas of high infiltration rates, which include the channels themselves, as most are natural, sandy-bottomed. As a result, a storm of 0.25 inches is unlikely to elevate the baseflow in the River sufficiently to be defined as a wet weather event. Therefore, a higher predicted rainfall trigger is included to ensure that sampling occurs during an event that generates runoff that makes it to the receiving water. Additionally, 1 inch of rainfall corresponds to the average rainfall depth for the watershed constituting the 85th percentile runoff volume. Wet weather sampling events will be separated by a minimum of three days of dry conditions (<0.1 inch of rain each day).

For significant non-stormwater outfall monitoring events at outfall locations identified through the non-stormwater screening process, samples will not be collected if the discharge is not reaching a receiving water body. These sites are only being sampled to identify potential impacts on receiving waters. As a result, if the discharge is not reaching the receiving water, collection of a sample is not necessary. The field conditions will be documented and photographed to demonstrate that the outfall discharge is not impacting receiving waters.

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[7] Because a significant storm event is based on predicted rainfall, it is recognized that this monitoring may be triggered without 1” of rainfall actually occurring. In this case, the monitoring event will still qualify as meeting this requirement provided that sufficient sample volume is collected to do all required laboratory analysis. Documentation will be provided showing the predicted rainfall amount.

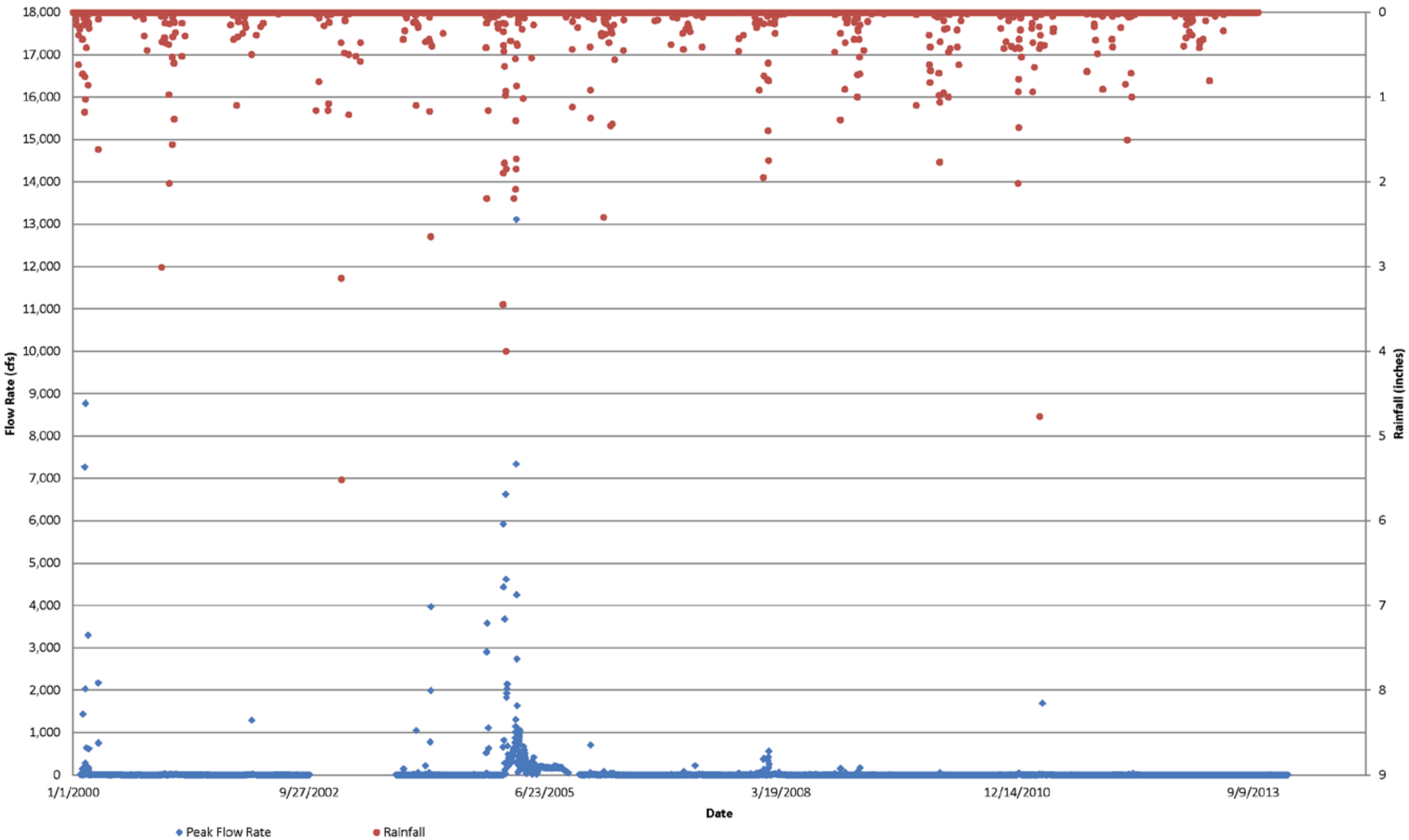

Figure 5. Peak Flow Rate and Rainfall Data for Santa Clara River Reach 5 at the Old Road Bridge[8]

[8] Graph provided by Los Angeles County Department of Public Works.

6 Monitoring Parameters

The parameters outlined in the MRP to be monitored at receiving water and outfall monitoring locations are summarized in **Table 8.** As part of the EWMP, the USCRWMG have conducted a data analysis to determine water quality priorities for the watershed. While the water quality priorities analysis will be finalized as part of the EWMP development, an initial characterization of the water quality priorities has been developed (**Attachment A**). The water quality priorities analysis is utilized in the CIMP to define the parameters that will be monitored at each site. Since the analysis is reach specific, different parameters will be monitored at different monitoring locations. The initial analysis used to develop the parameters to be monitored at each site is shown in **Table 9.**

Table 8. Summary of MS4 Permit Required Monitoring Parameters

Classification Identified in Permit	Receiving Water [1]	Stormwater Outfall [2]	Non-Stormwater TMDL Outfall	Significant Non Stormwater Outfall [2]
Flow	X	X	X	X
Field measurements: DO, pH, temp, specific conductivity	X	X	X	X
Hardness and TSS	X	X		X
Pollutants assigned TMDL WLAs	X	X	X	X
Pollutants identified for 303(d)-listed receiving waters	X	X		X
Aquatic Toxicity	X	X[3]		X[3]
Parameters in Table E-2 of the MRP[5]	X	X[4]		X[4]

1. All parameters will be monitored at SNTCLR_6_ME. The parameters monitored at the other locations will vary based on the water quality priority analysis.
2. The parameters monitored at the outfall locations will be set equal to the constituents to be sampled in the reach to which the outfall discharges for the first year of monitoring. After the first year, receiving water monitoring results, toxicity analysis, and non-stormwater screening results will be used to define the constituents to be monitored as outlined in Section 10.
3. Toxicity monitoring is only required when triggered by recent receiving water toxicity monitoring where a toxicity identification evaluation (TIE) on the observed receiving water toxicity test was inconclusive.
4. Parameters in Table E-2 are only monitored at outfall locations if they are identified as exceeding applicable water quality objectives.
5. Parameters in Table E-2 that are listed in Attachment C will be monitored during the first year and any found to be exceeding objectives would continue to be monitored.

All constituents that were identified as a water quality priority will be included in the monitoring program.[9] Based on the water quality priorities analysis, a number of constituents were identified as having not been detected in the past ten years of monitoring. As a result, parameters in Table E-2 of the MRP will not be monitored during the first year if they have not been detected at any monitoring location in the past ten years of monitoring. **Attachment C** lists the constituents that will be monitored during the first year. The constituents in **Attachment C** that are not water

[9] Category 2B and 2D contain 303(d) listings for Eutrophic and Fish Kills. Dissolved oxygen will be monitored and considered to be a representative constituent for evaluating those conditions.

quality priorities will be assessed with applicable water quality objectives after the first year of ME monitoring. If the constituents are not detected during the first year at levels above applicable objectives, monitoring for those constituents will cease. Additionally, the monitoring parameters may be modified throughout the monitoring process as outlined in the adaptive management process (Section 11).

A summary of the monitoring frequencies and parameters for each monitoring site are shown in **Table 10**.

Table 9. Summary of Initial Water Quality Priority Characterization

Class[1]	Constituent	Santa Clara River Reach				Bouquet Canyon	Lake Elizabeth	Mint Canyon	Piru Creek	Munz Lake	Lake Hughes	Castaic Lake	Pyramid Lake	Los Angeles River
		4B	5	6	7									
Category 1A: WBPCs with past due or current term TMDL deadlines with exceedances in the past 5 years.														
Bacteria	E. Coli (dry)	I	I		I									
Salts	Chloride	F	F	F	F									
Category 1B: WBPCs with TMDL deadlines beyond the current Permit term and with exceedances in the past 5 years.														
Bacteria	E. Coli (wet and dry)	F	F		F									
Category 1D: WBPCs with past due or current term deadlines without exceedances in the past 5 years.														
Nutrients	Ammonia	F	F	F	F									
Nutrients	Nitrate and Nitrite	F	F	F	F									
Trash	Trash						F							
Bacteria	E. Coli (wet and dry)			I/F										
Category 1E: WBPCs with TMDLs for which MS4 discharges are not causing or contributing														
Trash	Trash									TMDL	TMDL			F
Nutrients	Ammonia													F
Nutrients	Nitrate and Nitrite							TMDL[3]						F
Bacteria	E. Coli													I
Metals	Cadmium													I
Metals	Copper													I
Metals	Lead													I
Metals	Selenium													I
Metals	Zinc													I

Class[1]	Constituent	Santa Clara River Reach				Bouquet Canyon	Lake Elizabeth	Mint Canyon	Piru Creek	Munz Lake	Lake Hughes	Castaic Lake	Pyramid Lake	Los Angeles River
		4B	5	6	7									
Category 2A: 303(d) Listed WBPCs with exceedances in the past 5 years.														
Metals	Copper			303 (d)										
	Iron		D	303 (d)										
TBD	Cyanide			L										
Category 2B: 303(d) Listed WBPCs that are not a "pollutant"[3] (i.e., toxicity).														
TBD	Aquatic Toxicity			303 (d)										
TBD	pH				L		303(d)							
TBD	Eutrophic						303(d)							
TBD	Organic Enrichment/ Low DO						303(d)							
Category 2C: 303(d) Listed WBPCs without exceedances in past 5 years.														
Pesticides	Chlorpyrifos			D										
Pesticides	Diazinon			D										
Category 2D: 303(d) Listed WBPCs for which MS4 discharges are not causing or contributing														
Metals	Mercury											303(d)	303(d)	
TBD	Eutrophic									303(d)	303(d)			
TBD	Fish Kills										303(d)			
TBD	Odor										303(d)			
TBD	Algae										303(d)			
TBD	pH								303(d)					
Salts	Chloride								303(d)					

Class[1]	Constituent	Santa Clara River Reach				Bouquet Canyon	Lake Elizabeth	Mint Canyon	Piru Creek	Munz Lake	Lake Hughes	Castaic Lake	Pyramid Lake	Los Angeles River
		4B	5	6	7									
Category 3A: WBPCs with exceedances in the past 5 years.														
Metals	Copper		X		X									
	Mercury		X	X	X									
	Selenium			X										
	Zinc			X										
TBD	Cyanide				X									
Salts	TDS		X											
Category 3C: WBPCs without exceedances in past 5 years.														
TBD	Bis-2 Ethylhexyl phthalate			X										
Category 3D: Other EWMP Priorities														
Pesticides	Pyrethroids					X								

1. Pollutants are considered in a similar class if they have similar fate and transport mechanisms, can be addressed via the same types of control measures, and within the same timeline already contemplated as part of the Watershed Management Program for the TMDL.
2. Interim limits for dry E. Coli during permit term, interim limits for wet E. Coli past permit term, final limits for dry and wet past permit term.
3. The Nitrogen TMDL addresses Mint Canyon; however there are no MS4 WLAs that apply.

I=Interim TMDL Effluent or Receiving Water Limit

F=Final TMDL Effluent or receiving water limit

D=303(d) listing that could now be delisted and has no exceedances in last 5 years

303(d)=Confirmed 303(d) Listing

L=WBPC that meets the listing criteria

TMDL=TMDL that does not contain MS4 allocations for the reach

TBD=To be determined– used for conditions (pH and dissolved oxygen) that are not pollutants, per se, or constituents where the linkage to another type of constituent will be further investigated during EWMP development.

Table 10. Summary of Proposed Monitoring Program for USCRWMG

Constituent	Annual Frequency (number wet events/number dry events)												
	Santa Clara River												Lake Elizabeth
	Reach 5				Reach 6					Reach 7			
	SNTCLR_5_RE [1]	Salt Canyon HUC-12 [1,2]	Lower Castaic Creek HUC-12[1,2]	Significant NSW Outfalls[3]	SNCLR_6_ME [1]	San Francisquito Canyon HUC-12[1,2]	South Fork Santa Clara River HUC-12[1,2]	Sand Canyon HUC-12[1,2]	Significant NSW Outfalls[3]	SNTCLR_7_R-A[1]	Mint Canyon HUC-12[1,2]	Significant NSW Outfalls[3]	Lake Elizabeth East [10]
Flow and field parameters[4]	3/2	3/2	3/2	2	3/2	3/2	3/2	3/2	2	3/2	3/2	2	3/2
Pollutants identified in Table E-2 of the MRP[5]					1[6]/1[6]								
Aquatic Toxicity[13]	[12]				2/1					[12]			
TSS and Hardness	3/2	3	3	2	3/2	3	3	3	2	3/2	3	2	
Ammonia	3/2	3/2	3/2	2	3/2	3/2	3/2	3/2	2	3	3/2	2	3/2
Nitrate-Nitrogen	3/2	3/2	3/2	2	3/2	3/2	3/2	3/2	2	3	3/2	2	3/2
Nitrite-Nitrogen	3/2	3/2	3/2	2	3/2	3/2	3/2	3/2	2	3	3/2	2	3/2
Chloride	3/2	3/2	3/2	2	3/2	3/2	3/2	3/2	2	3/2	3/2	2	
TDS	3/2	3	3	2									
E. coli (Bacteria TMDL)	3/2[7]	3/2	3/2	2	3/2[7]	3/2	3/2	3/2	2	3/2[7]	3/2[7]	2	
Copper	3/2	3	3	2	3/2	3	3	3	2	3/2	3	2	
Iron	3/2	3	3	2	3/2	3	3	3	2				
Mercury	3/2	3	3	2	3/2	3	3	3	2	3/2	3	2	
Selenium					3/2	3	3	3	2				
Zinc					3/2	3	3	3	2				
Total Kjeldahl Nitrogen or Organic Nitrogen													3/2

Constituent	Annual Frequency (number wet events/number dry events)												
	Santa Clara River												Lake Elizabeth
	Reach 5				Reach 6					Reach 7			
	SNTCLR_5_RE [1]	Salt Canyon HUC-12 [1,2]	Lower Castaic Creek HUC-12[1,2]	Significant NSW Outfalls[3]	SNCLR_6_ME [1]	San Francisquito Canyon HUC-12[1,2]	South Fork Santa Clara River HUC-12[1,2]	Sand Canyon HUC-12[1,2]	Significant NSW Outfalls[3]	SNTCLR_7_R-A[1]	Mint Canyon HUC-12[1,2]	Significant NSW Outfalls[3]	Lake Elizabeth East [10]
Orthophosphate-Phosphorus													3/2
Total Phosphorus													3/2
Cyanide[8]					3/2	3	3	3	2	3/2	3	2	
Bis (2-ethylhexyl) Phthalate[9]					1/1[6]								
Chlorpyrifos[11]					1/1[6]								
Diazinon[11]					1/1[6]								

1. Annual frequency listed as 3/2 signifies the number of wet-weather events per year/number of dry-weather events per year.
2. Boxes with a monitoring frequency listed as 3 are for wet weather only.
3. Significant NSW monitoring locations will be determined after outfall screening and source identification. Monitoring frequency shown is for dry weather only.
4. Field parameters are defined as DO, pH, temperature, and specific conductivity.
5. Attachment C lists the parameters from Table E-2 that will be monitored at this site. An analysis has been conducted to determine which Permit Required Pollutants should not be monitored during the first year due to previously collected results indicating that the Permit Required Pollutant has never been detected in any reach in the EWMP area.
6. Monitoring frequency only applies during the first year of monitoring. For pollutants that are not detected at the Method Detection Limit for its respective test method or the result is below the lowest applicable water quality objective, additional monitoring will not be conducted (i.e., the monitoring frequency will become 0/0). For pollutants that are detected above the lowest applicable water quality objective, additional monitoring will be conducted for the condition under which the exceedance occurred (wet or dry), at the frequency specified in the MRP (i.e., the monitoring frequency will become 3 for a wet weather exceedance, 2 for a dry weather exceedance, or 3/2 for exceedances during both event types) beginning the next monitoring year.
7. This will be the initial monitoring frequency for this permit term. The monitoring frequency will change to weekly at a time to be determined during EWMP development to correspond with milestones developed for compliance with the Bacteria TMDL when comparison to the geometric mean is needed.
8. Cyanide is likely to be from POTW discharges, as it is unlikely to have MS4 sources, it may be removed if the MS4 is determined not to be a source.
9. Bis (2-ethylhexyl)Phthalate is not suspected to have MS4 sources. Additionally, no exceedances have been observed in the past 5 years.
10. Lake Elizabeth outfall site will be sampled for one year to identify whether or not the MS4 contributes to the lake's 303(d) listing for eutrophic conditions. The results will then be evaluated to determine whether monitoring shall continue.
11. Sufficient monitoring data is available to support 303(d) delisting of this constituent and no exceedances have occurred in the past 5 years. A summary of the available monitoring data supporting the delisting is presented in Attachment A. If exceedances of this constituent occur during the first year of monitoring at the receiving water site, outfall monitoring will comments during the next monitoring year for sites within Reach 6 for the condition under which the exceedance occurred (wet or dry weather).

12. If the toxicity test results at receiving water site SNCLR_6_ME exceed the toxicity identification evaluation (TIE) thresholds and the results are inconclusive, toxicity testing will commence at the upstream (SNTCLR_7_RA) and downstream (SNCLR_5_RE) receiving water sites for the condition under which the TIE trigger occurred (wet weather or dry weather). Should no toxicity occur at the reach 5 or reach 7 receiving water sites, toxicity testing will cease at both or either location (wherever the TIE threshold was not met). If toxicity at the reach 5 or 7 receiving water sites meets the TIE threshold, a TIE will be conducted and will follow the process outlined in Figure 6 starting with the “Conduct TIE” box in the flow chart.
13. Aquatic toxicity outfall monitoring will follow the process outlined in Section 7.3, additional details may be found in Attachment F.

7 Monitoring Procedures Overview

Detailed monitoring procedures are outlined in **Attachment F**. This section provides an overview of the content of **Attachment F** and highlights key elements of the monitoring procedures.

7.1 SAMPLING METHODS

The MRP requires the following sampling methods:

- Grab samples shall be taken for constituents that are required to be collected as such; in instances where grab samples are generally expected to be sufficient to characterize water quality conditions (primarily dry weather); and where the sample location limits Permittees' ability to install an automated sampler.
- Flow-weighted composite samples shall be taken for stormwater outfall samples and non-stormwater outfall samples.

For implementation of this USCR CIMP, grab samples will be collected at all monitoring locations except the mass emission site (SNTCR_6_ME) where 3-hour time-weighted grab sample composites will be collected, consistent with the protocols established during the previous permit term. Grab samples will be collected for both wet and dry weather. Grabs samples are justified for this watershed as most of the receiving water limitation exceedances occur during dry weather. Additionally, the chloride and nutrient TMDLs are only of concern during dry weather when grabs can be considered representative and bacteria samples are collected as grab samples. Therefore all TMDL sampling is appropriately characterized by grab samples. Additionally, most areas of the USCRWMG consist of soft bottom, meandering channel(s), which would make installation of composite sampling equipment difficult to locate and ensure flows were collected. Predicting flow patterns is also difficult in this watershed as the river and tributaries remain dry for the majority of the year. Manual composites are prohibitive due to the staffing, cost, and geographic spread of the monitoring sites that would need to be visited multiple times within a single monitoring event and would not provide more accurate water quality characterization. Samples will be collected at all applicable outfall and receiving water monitoring during a given event to the extent feasible to allow comparison between outfall and receiving water data.

Receiving water and outfall monitoring will be coordinated to effectively assess MS4 contributions to the receiving water. A phased approach to sampling will be conducted for the CIMP, and will allow for additional field reconnaissance to ensure that all sites are appropriate and accessible. Should any of the selected sites be deemed infeasible, the reasons for the site change and details regarding the replacement site will be provided in a CIMP update. During the first year, two outfall monitoring locations will be sampled along with all receiving water locations. During the second year, monitoring will be conducted at the two initial outfall locations, plus two more. In the third year, all outfall locations will be monitored. The phasing will allow the evaluation of the outfall monitoring locations and help evaluate the need for composite sampling at the outfall locations. Due to the nature of the watershed, some of the selected outfalls have small drainage areas because the entire HUC-12 is located in a canyon. Additionally, the watershed is primarily undeveloped and therefore most of the outfall locations contain contributions from undeveloped land. Finally, six outfall sites have been selected to represent two jurisdictions in one EWMP area draining to three river reaches. Phasing in outfall sampling will allow evaluation of the sites to determine if any need to be changed due to significant contributions from non-MS4 sources or other reasons such that sampling is not feasible at a site and to evaluate whether any of the sites are duplicative.

As part of the CIMP revision process, the need to conduct composite sampling at the outfall monitoring sites will be evaluated. At that point, the best method for collecting composite samples will be decided (manual or automated). If warranted, a gradual implementation of composite sampling at the stormwater outfall monitoring locations will be implemented.

For both types of non-stormwater outfall monitoring, grab samples will be collected and an evaluation of the need for composite samples will be based on the actions needed to address the outfall.

For significant NSW outfalls identified through the non-stormwater outfall screening process, samples will only be collected if the discharge could reach the receiving water. If the receiving water is not flowing or if it is not possible for the discharge to reach the receiving water, then the non-stormwater discharge will not impact the receiving water and does not need to be monitored.

The sampling methods in **Attachment F** include protocols for sample collection using grab and composite sampling methods, flow measurement procedures, sample volume, time of sample collection and other procedures required in the MRP to encompass any methods that may be used during CIMP monitoring.

7.2 ANALYTICAL AND QA/QC PROCEDURES

Attachment F also includes detailed analytical and Quality Assurance/Quality Control procedures, consistent with 40 CFR Part 136 for the analysis of pollutants.[10]

Once laboratories have been selected for the monitoring program, standard operating procedures and QA/QC protocols specific to the laboratory will be incorporated as appendices to **Attachment F**.

7.3 TOXICITY MONITORING AND TOXICITY INVESTIGATION EVALUATIONS

Detailed procedures for toxicity monitoring are outlined in **Attachment F**. This section provides an overview of the process that will be used to evaluate receiving water toxicity data, conduct toxicity identification evaluations (TIEs) if triggered, and initiate additional outfall monitoring if needed.

Toxicity monitoring will be conducted using *Ceriodaphnia dubia* (water flea) (refer to **Attachment F** Section 1.4.1 Sensitive Species Selection). Toxicity samples will be collected at receiving water locations at the frequency outlined in **Table 7** and according to **Table 10**. The procedure outlined in **Figure 6** will be used to evaluate the results of the sample, determine if a TIE is necessary, and utilize the results of a TIE (if conducted) to adapt the monitoring program.

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[10] Unless another test procedure is required under 40 CFR subchapters N or O or is otherwise specified in this Order for such pollutants [40 CFR sections 122.41(j)(4) and 122.44(i)(1)(iv)].

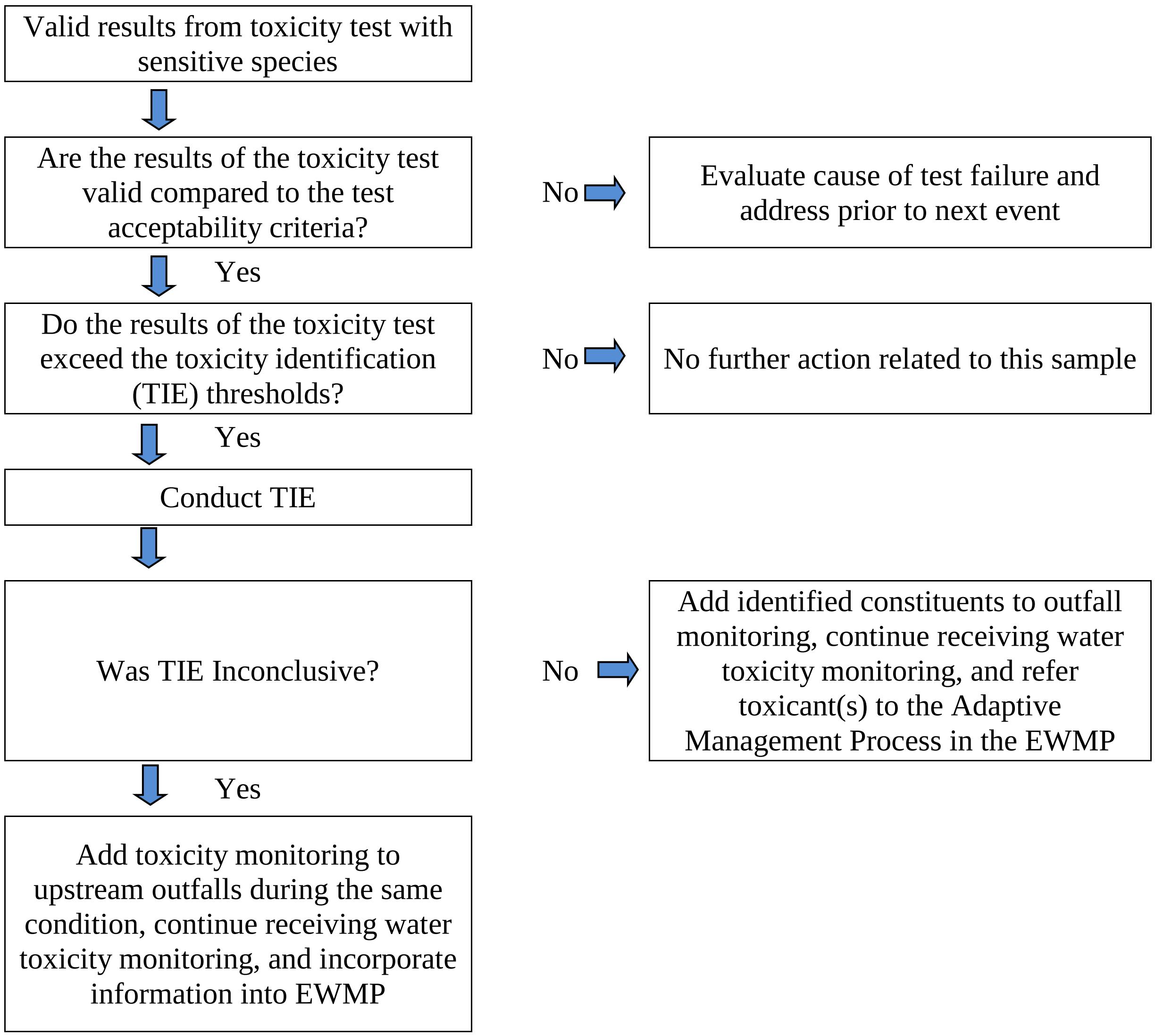


Figure 6. Aquatic Toxicity Assessment Process

8 Non-Stormwater Screening Program

The Non-Stormwater Outfall Screening Program is a multi-step process to identify and address non-stormwater discharges to the receiving waters. The outfall screening and monitoring process is intended to meet the following objectives (Part IX.A of the MRP):

1. Develop criteria or other means to ensure that all outfalls with significant non-stormwater discharges are identified and assessed during the term of the Permit.
2. For outfalls determined to have significant non-stormwater flow, determine whether flows are the result of IC/IDs, authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources.
3. Refer information related to identified IC/IDs to the IC/ID Elimination Program (Part VI.D.10 of the Permit) for appropriate action.
4. Based on existing screening or monitoring data or other institutional knowledge, assess the impact of non-stormwater discharges (other than identified IC/IDs) on the receiving water.
5. Prioritize monitoring of outfalls considering the potential threat to the receiving water and applicable TMDL compliance schedules.
6. Conduct monitoring or assess existing monitoring data to determine the impact of non-stormwater discharges on the receiving water.
7. Conduct monitoring or other investigations to identify the source of pollutants in non-stormwater discharges.
8. Use results of the screening process to evaluate the conditionally exempt non-stormwater discharges identified in Parts III.A.2 and III.A.3 of the Permit and take appropriate actions pursuant to Part III.A.4.d of the Permit for those discharges that have been found to be a source of pollutants. Any future reclassification shall occur per the conditions in Parts III.A.2 or III.A.6 of the Permit.
9. Maximize the use of resources by integrating the screening and monitoring process into existing or planned IMP and/or CIMP efforts.

The non-stormwater screening process consists of the steps outlined in **Table 11**.

Table 11. Non-Stormwater Outfall Screening and Monitoring Program Summary

Element	Description
Develop MS4 outfall database	Develop a database of all major outfalls with descriptive information, linked to GIS.
Outfall screening	A screening process will be implemented to collect data for determining which outfalls exhibit significant NSW discharges.
Identification of outfalls with NSW discharge	Based on data collected during the Outfall Screening process, identify outfalls with NSW discharges.
Inventory of outfalls with significant NSW discharge	Develop an inventory of major MS4 outfalls with known significant NSW discharges and those requiring no further assessment.
Prioritize source investigation	Use the data collected during the screening process to prioritize significant outfalls for source investigations.
Identify sources of significant discharges	For outfalls exhibiting significant NSW discharges, perform source investigations per the prioritization schedule. If not exempt or unknown, determine abatement process.
Monitor discharges exceeding criteria	Monitor outfalls that have been determined to convey significant NSW discharges comprised of either unknown or non-essential conditionally exempt discharges, or continuing discharges attributed to illicit discharges must be monitored.

Each of these steps is discussed in more detail in the following subsections and a flow chart of the process is shown in **Figure 7**.

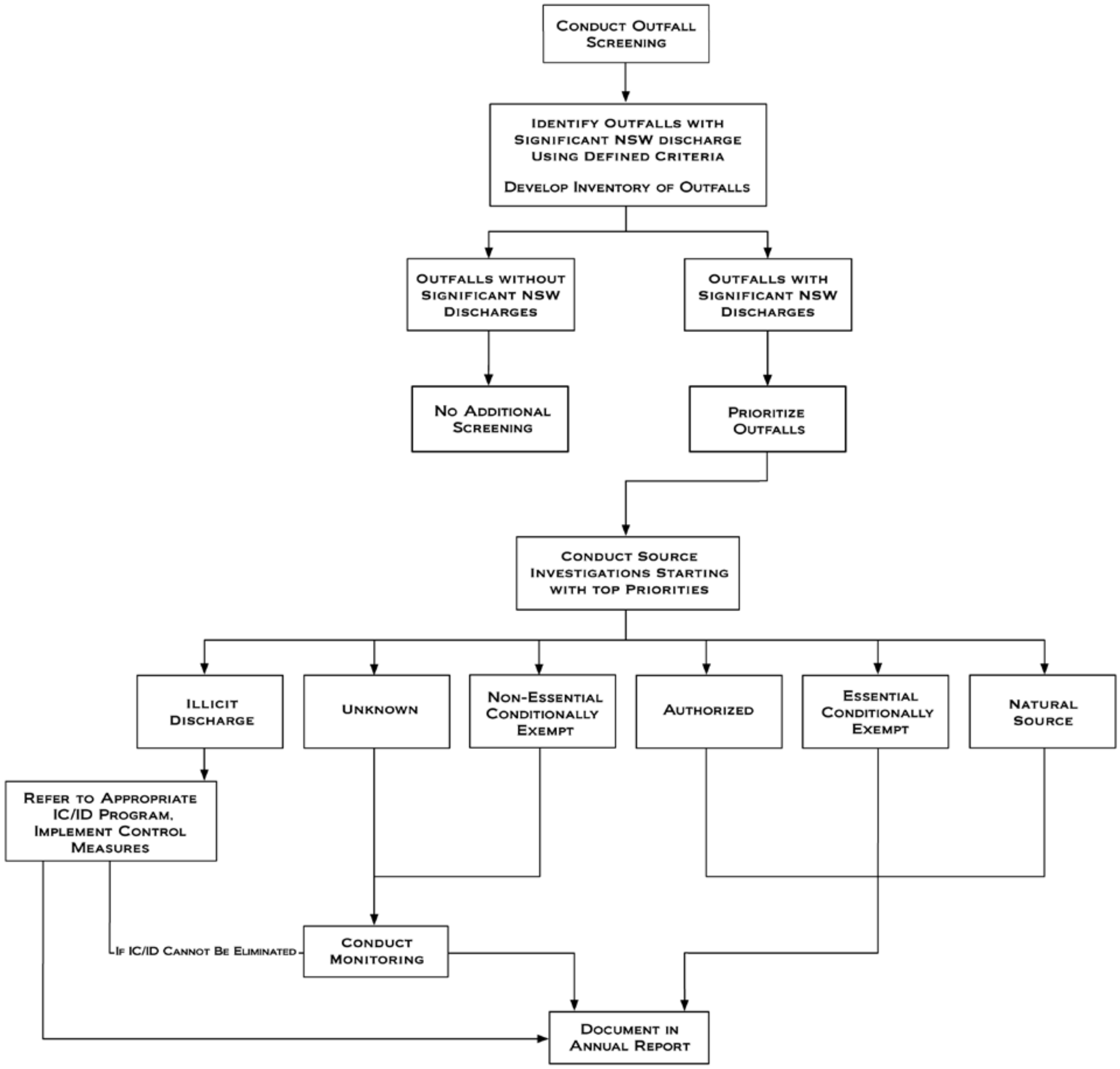


Figure 7. Non-Stormwater Outfall Screening Program

8.1 OUTFALL DATABASE

The non stormwater outfall screening program requires the development of an MS4 outfall database by the time that the CIMP is submitted. GIS outfall database files are being submitted in conjunction with this CIMP. The objective of the MS4 database is to geographically link the characteristics of the outfalls within the EWMP area with watershed characteristics including: subwatershed, waterbody, land use, and effective impervious area. The database must contain the elements described in **Table 12**. The information will be compiled into geographic information systems (GIS) layers.

Table 12. MS4 Database Elements

Database Element	Submitted	Part of CIMP Implementation[1]
Surface water bodies within the Group Member jurisdictions.	X	
Sub-watershed (HUC-12) boundaries.	X	
Land use overlay.	X	
Effective Impervious Area (EIA) overlay (if available).	[2]	
Jurisdictional boundaries.	X	
The location and length of all open channel and underground pipes 18 inches in diameter or greater (with the exception of catch basin connector pipes).	X	
The location of all dry weather diversions.	X	
The location of all major MS4 outfalls within the Permittee's jurisdictional boundary. Each major outfall shall be assigned an alphanumeric identifier, which must be noted on the map.	X[3]	
Notation of outfalls with significant non-stormwater discharges (to be updated annually).		X[4]
Storm drain outfall catchment areas for each major outfall within the Permittee(s) jurisdiction.	X[5]	
Each mapped MS4 outfall shall be linked to a database containing descriptive and monitoring data associated with the outfall. The data shall include:		
Ownership	X	
Coordinates	X	
Physical description	X	
Photographs of the outfall, where possible, to provide baseline information to track operation and maintenance needs over time		X[6]
Determination of whether the outfall conveys significant non-stormwater discharges.		X[4]
Stormwater and non-stormwater monitoring data		X[6]

1. All information gathered as part of CIMP implementation will be submitted annually as part of the annual reports.
2. The submitted WMMS catchments have land use and runoff information that can be used to approximate EIA and the City has a database with Assessor Parcel Numbers (APNs) and runoff factors that is available if needed for this layer.
3. All outfalls greater than 36 inches have been defined. Outfalls that are considered "major" for other reasons as identified in the Permit (see Permit Attachment A page A-11 for complete definition of major outfalls) have not been defined at this time. The database will be updated as information is developed.
4. The determination of significant will be made after the initial screening process outlined in the CIMP is completed using the criteria presented in Section 8.3.
5. The WMMS drainage areas have been included in the database at this time as a representation of larger drainage areas for several outfalls and an approximate delineation of the catchment area for the stormwater outfall monitoring locations has been defined. Further refinement for the catchments will be done in prioritized order based on the non-stormwater screening process.
6. This data will be gathered as part of the screening and monitoring program and will be added to the database as it is gathered.

As shown in the table, not all information was available at this time for submittal as part of the CIMP. Most items currently not available will be collected through implementation of the Non-Stormwater Outfall Screening Program as noted in the table footnotes. As the data becomes available, it will be entered into the database. Each year, the storm drains, channels, outfalls, and associated database will be updated to incorporate the most recent characterization data for outfalls with significant non-stormwater discharge. The updates will be included as part of the annual reporting to the Regional Water Board.

8.2 INITIAL NSW OUTFALL SCREENING PROCESS

The NSW outfall screening program will begin with a field check of all major outfalls as defined in the permit[11] in the database to gather the necessary field information to populate the database. During the initial field screening, outfalls will be observed during dry weather, at least 72 hours after a rain event of 0.1 inches or greater. During the initial field screening, the following information will be gathered using the field inspection form in **Attachment F** or equivalent:

a. Date, Time, Weather
b. Photos of outfall and receiving water using a GPS-enabled camera
c. Coordinates of outfall
d. Physical descriptions of outfall, site condition, and accessibility
e. Discharge characteristics, such as odor and color
f. Presence of flow
g. Receiving water characteristics

After the initial event, NSW outfalls where flow greater than a trickle was observed during the initial screening event will be revisited for two more events. During the second and third screening events, all of the information listed above will be gathered. In addition, visual field estimates of flow will be gathered.

8.3 IDENTIFICATION OF OUTFALLS WITH SIGNIFICANT NON-STORMWATER DISCHARGES

The three initial outfall screening events will be used to define the outfalls that require no further assessment and outfalls with significant non-stormwater discharges. Outfalls will be noted as requiring "No Further Assessment" in the outfall database if:

a. No flow is observed from the outfall.
b. The source is confirmed to be from NPDES permitted, categorically exempt essential flow or natural flow, or
c. Flow is categorized as not significant.

The MRP (Part IX.C.1) states that one or more of the following characteristics may determine significant non-stormwater discharges:

- Discharges from major outfalls subject to dry weather TMDLs.
- Discharges for which monitoring data exceeds non-stormwater action levels (NALs).
- Discharges that have caused or may cause overtopping of downstream diversions.
- Discharges exceeding a proposed threshold discharge rate as determined by the Group Members.
- Other characteristics as determined by the EWMP Group and incorporated within the screening program.

The data collected during the outfall screening process, along with other information about the outfall catchment area, will be utilized to determine which outfalls observed to be flowing during

[11] Major outfalls defined as 36" or greater (or equivalent with drainage area of more than 50 acres) or 12" or greater (or equivalent with drainage area of 2 acres or more) that drain areas zoned as industrial.

the screening process will be categorized as having “significant discharge.” Many factors will be taken into consideration when determining significant outfall discharges and will include the following criteria:

- Proximity of the outfall to the main stem of the Santa Clara River where TMDLs apply.
- Outfall has persistent flows, meaning flow was observed on two or more of the three screenings at a rate “greater than a garden hose”.[12]
    - Flow will be categorized as follows:
        - No Flow/Wet (0 gpm)
        - Trickle (<2 gpm)
        - Garden Hose (2-10 gpm)
        - Greater than Garden Hose (>10 gpm)
- Characteristics of the catchment area, including but not limited to, presence of permitted discharges in the area, land use characteristics, and previous IC/ID results.

Outfalls with significant non-stormwater discharge will also be designated in an inventory to be included in the MS4 outfall database.

8.4 INVENTORY OF MS4 OUTFALLS WITH SIGNIFICANT NON-STORMWATER DISCHARGES

An inventory of MS4 outfalls must be developed identifying those outfalls with known significant non-stormwater discharges and those requiring no further assessment (Part IX.D of the MRP). If the MS4 outfall requires no further assessment, the inventory must include the rationale for the determination of no further action required. The inventory will be included in the outfall database. Each year, the inventory will be updated to incorporate the most recent characterization data for outfalls with significant non-stormwater discharges.

The following physical attributes of outfalls with significant non-stormwater discharges must be included in the inventory. These characteristics will be collected as part of the screening process:

a. Date and time of last visual observation or inspection
b. Outfall alpha-numeric identifier
c. Description of outfall structure including size (e.g., diameter and shape)
d. Description of receiving water at the point of discharge (e.g., natural, soft-bottom with armored sides, trapezoidal, concrete channel)
e. Latitude/longitude coordinates
f. Nearest street address
g. Parking, access, and safety considerations
h. Photographs of outfall condition
i. Photographs of significant NSW discharge or indicators of discharge unless safety considerations preclude obtaining photographs
j. Estimation of discharge rate
k. All diversions either upstream or downstream of the outfall

[12] Inaccessible outfalls observed to have persistent flows “greater than garden hose” at the nearest downstream receiving water or nearest upstream manhole will also be considered significant.

l. Observations regarding discharge characteristics such as odor, color, presence of debris, floatables, or characteristics that could aid in pollutant source identification.

8.5 PRIORITIZED SOURCE IDENTIFICATION

Once the major outfalls exhibiting significant non-stormwater discharges have been identified through the screening process and incorporated in the inventory, Part IX.E of the MRP requires that the USCRWMG prioritize the outfalls for further source investigations. The MRP identifies the following prioritization criteria for outfalls with significant non-stormwater discharges:

- Outfalls discharging directly to receiving waters with WQBELs or receiving water limitations in the TMDL provisions for which final compliance deadlines have passed.
- All major outfalls and other outfalls that discharge to a receiving water subject to a TMDL shall be prioritized according to TMDL compliance schedules.
- Outfalls for which monitoring data exist and indicate recurring exceedances of one or more of the Action Levels identified in Attachment G of the Permit.
- All other major outfalls identified to have significant non-stormwater discharges.

In addition to the permit requirements, the following criteria will be considered when developing the prioritization schedule:

- Rate of discharge based on visual flow observations
- Size of outfall
- Odor, color and clarity of discharge
- Results of the field measurements of pH, temperature, DO, and EC
- Presence of flow in the receiving water

Once the prioritization is complete, a source identification schedule will be developed. The scheduling will focus on the outfalls with the highest priorities first. Unless the results of the field screening justify a modification to the schedule in the MRP, the schedule will ensure that source investigations are completed on no less than 25% of the outfalls with significant non-stormwater discharges by December 28, 2015 and 100% by December 28, 2017.

8.6 SIGNIFICANT NON-STORMWATER DISCHARGE SOURCE IDENTIFICATION

The screening and source identification component of the program is used to identify the source(s) and point(s) of origin of the non-stormwater discharge. Based on the prioritized list of major outfalls with significant non-stormwater discharges, investigations will be conducted to identify the source(s) or potential source(s) of non-stormwater flows.

Part IX.A.2 of the MRP requires Permittees to classify the source investigation results into one of four endpoints outlined as follows and summarized in **Table 13**:

A. Illicit connections or illicit discharges (IC/IDs): If the source is determined to be an illicit discharge, the Permittee must implement procedures to eliminate the discharge consistent with IC/ID requirements (Permit Part VI.D.10) and document actions.
B. Non-essential Conditionally Exempt: If the source is determined to be a non-essential conditionally exempt discharge, the Group Member must conduct monitoring consistent with Part IX.G of the MRP to determine whether the discharge should remain conditionally exempt or be prohibited.

C. Essential Conditionally Exempt: If the source is determined to be a conditionally exempt essential discharge, the Group Members must document the source.
D. Authorized: If the source is determined to be an NPDES permitted discharge, a discharge subject to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Group Members must document the source.
E. Natural flows: If the source is determined to be natural flows, the Permittee must document the source.
F. Unknown sources: If the source is unknown, the Permittee must conduct monitoring consistent with Part IX.G of the MRP.

Table 13. Summary of Endpoints for Source Identification

Endpoint	Follow-up	Action Required by Permit
A. Illicit Discharge or Connection	Refer to IC/ID program	Implement control measures and report in annual report. Monitor if cannot be eliminated.
B. Authorized or Conditionally Exempt Discharges(1,2)	Document and identify if essential or non-essential	Monitor non-essential discharges(3)
C. Natural Flows	End investigation	Document and report in annual report
D. Unknown	Refer to IC/ID program	Monitor

1. Discharges authorized by a separate NPDES permit, a discharge subject to a Record of Decision approved by USEPA pursuant to section 121 of CERCLA, or is a conditionally exempt NSW discharge addressed by other requirements. Conditionally exempt NSW discharges addressed by other requirements are described in detail in Part III.A. Prohibitions – Non-Stormwater Discharges of the Permit.
2. Per Section III.A.4 of the permit, if the Permittee determines that an authorized or conditionally exempt essential non-storm water discharge is a source of pollutants that causes or contributes to an exceedance of applicable RWL and/or water quality-based effluent limitations, the Regional Water Board will be notified within 30 days.
3. If monitoring data demonstrates that conditionally exempt non-storm water discharges are a source of pollutants that causes or contributes to an exceedance of applicable RWL and/or water quality-based effluent limitations, the findings will be reported to the RWQCB in the annual report. Additionally, per Section III.A.4 of the permit, the Permittee will either effectively prohibit the NSW discharge; impose conditions in addition to those in Table 8 of the permit, subject to approval by the EO, such that the NSW discharge will not be a source of pollutants; require diversion of the NSW discharge to the sanitary sewer; or require treatment of the NSW discharge prior to discharge to the receiving water.

Source investigations will be conducted using site-specific procedures based on the characteristics of the NSW discharge. Investigations could include:

- Identifying permitted discharges within the catchment area.
- Identifying if the flow is from a channelized stream or creek.
- Following dry weather flows from the location where they are first observed in an upstream direction along the conveyance system.
- Compiling and reviewing available resources including past monitoring and investigation data, land use/MS4 maps, aerial photography, and property ownership information.
- Gathering field measurements to characterize the discharge.

Based on the results of the source assessment, outfalls may be reclassified as requiring no further assessment and the inventory will be updated to reflect the information and justification for the reclassification.

Where investigations determine the non-stormwater source to be authorized, natural, or essential conditionally exempt flows, the EWMP Group will conclude the investigation, categorize the outfall as requiring no further assessment in the inventory, and move to the next highest priority outfall for investigation. Where investigations determine that the source of the discharge is non-essential conditionally exempt, an illicit discharge, or is unknown – further investigation may be conducted to eliminate the discharge or demonstrate that it is not causing or contributing to receiving water problems. In some cases, source investigations may ultimately lead to prioritized programmatic or structural BMPs. Where Permittees determine that they will address the non-stormwater discharge through modifications to programs or by structural BMP implementation, the EWMP Group will incorporate the approach into the implementation schedule developed for the EWMP Group and the outfall can be lowered in priority for investigation, such that the next highest priority outfall can be addressed.

8.7 NON-STORMWATER DISCHARGE MONITORING

As identified in **Table 13**, outfalls that have been determined to convey significant non-stormwater discharges where the source investigations concluded that the source is attributable to a continued illicit discharge (Endpoint A), non-essential conditionally exempt (Endpoint B), or unknown (Endpoint D) must be monitored. Constituents to be monitored, monitoring frequency, and monitoring procedures are outlined in Sections 4, 5, and 7 respectively.

Monitoring for non-stormwater discharges will be more dynamic than either the receiving water or stormwater outfall monitoring. As non-stormwater discharges are addressed, monitoring at the outfall will cease. Additionally, if monitoring demonstrates that discharges do not exceed any WQBELs, non-stormwater action levels, or water quality standards for pollutants identified on the 303(d) list, monitoring will cease at an outfall after the first year. Thus, the number and location of outfalls monitored has the potential to change on an annual basis. The process for adapting monitoring locations and frequency is presented in **Section 11**.

9 Other CIMP Components

9.1 OPTIONAL SPECIAL STUDIES

In addition to the permit required CIMP monitoring, optional special studies and applicable monitoring locations are included in the CIMP. The first set of optional locations are included to support characterization of receiving water quality and identification of sources for a USCRWMG identified water quality priority (pyrethroids in Bouquet Canyon). Additionally, an optional monitoring location is proposed for Reach 7 upstream of the USCRWMG EWMP area to assess potential bacteria contributions from natural areas consistent with optional special studies outlined in the Bacteria TMDL. The monitoring discussed in this section is optional and will be conducted at the discretion of the USCRWMG. Not all members of the USCRWMG may choose to participate in any optional monitoring that is identified in this CIMP.

Pyrethroid pesticides were identified in Bouquet Canyon as a WBPC that could warrant consideration in the EWMP process during the initial evaluation of water quality priorities. To gather additional information on this WBPC to determine if/how it should be considered during the EWMP process, a special study may be conducted. If undertaken, the monitoring conducted during this special study would be clearly distinct from the permit required monitoring discussed in the rest of the CIMP. In lieu of or in addition to the potential optional study, members of the

USCRWMG may initiate other actions through the EWMP to address pyrethroids that would potentially modify or reduce the need to conduct the optional special study. However, the information on sampling methods, analytical methods, quality assurance/quality control, and monitoring locations are included in the CIMP to ensure high quality data are collected if the monitoring is conducted.

If conducted, the special study would consist of receiving water monitoring and one outfall monitoring location. Outfall monitoring will focus on identifying sources to inform the implementation of control measures. Additionally, NSW outfall screening and monitoring conducted in this reach could consider the inclusion of pyrethroids or source investigations for these constituents if appropriate.

Optional monitoring locations to be considered for the optional special studies are included in **Table 14**.

Table 14. Optional Special Study Monitoring Locations

Receiving Water Monitoring Sites				
			Coordinates	
Site ID		Water Body	Latitude	Longitude
SNTCLR_7_FLG		SCR Reach 7	34.42972	-118.35444
SNTCLR_BC_SWAMP		Bouquet Canyon	34.42782	-118.54022
SNTCLR_BC_PARK		Bouquet Canyon	34.43267	-118.52596
Outfall Monitoring Site				
HUC-12	**Jurisdiction**	**Drain Name**	**Latitude**	**Longitude**
Lower Bouquet Canyon	City	PD 1256/ PD 1713	34.45648	-118.53596

Monitoring would occur at the same frequency as the required monitoring (3 wet and 2 dry) for one year. Additional monitoring would be conducted if needed based on the results of the first year of monitoring.

Separate from the pyrethroids special study, site SNTCLR_7_FLG may be considered as a special study receiving water site location to assess bacteria concentrations from upstream open space areas. In addition to the monitoring identified above, microbial source tracking monitoring for *Bacteroidales* for universal, human, and dog markers could be considered during implementation of the CIMP. Microbial source tracking could be conducted at any of the CIMP sites to assist with prioritization and identification of human sources, which represent increased human health risks (e.g., identifying leaking sewer lines).

9.2 NEW DEVELOPMENT/RE-DEVELOPMENT EFFECTIVENESS TRACKING

Participating agencies have developed mechanisms for tracking new development/re-developoment projects that have been conditioned for post-construction BMPs pursuant to MS4 Permit Part VI.D7. Agencies also have developed mechanisms for tracking the effectiveness of these BMPs pursuant to MS4 Permit Attachment E.X.

9.2.1 Existing New Development/Re-development Tracking Procedures

The Standard Urban Stormwater Mitigation Program (SUSMP) requirements implemented under the previous MS4 Permit (Order R4-01-182) laid the foundation for the MCMs contained in Part VI.D.7 of the current Permit. With implementation of the SUSMP, Permittees required post construction BMPs on applicable projects, developed standard requirements for project submittals, and began to track related data. The Permittees will build on the existing procedures for land development to ensure that all required project data is captured.

Although the data requirements are clear, the procedures for reviewing projects, tracking data, and reporting are different for each jurisdiction and may even be different across departments within the same jurisdiction. Due to the complexity of land development processes across jurisdictions, data management and tracking procedures will vary by jurisdiction.

To meet the requirements of the permit, internal procedures and data protocols will be developed that clearly define departmental roles and responsibilities pertaining to data collection, data management, and tracking. These procedures will include points in the process where data is generated and tracked, who is responsible for tracking the data, and how the data will be managed.

When developing data management protocols and internal procedures, USCRWMG Members will also consider the land development data tracking requirements contained in Part VI.D.7.d.iv.(1)(a). These requirements are distinct from those listed in the MRP but will likely be addressed similarly. Data requirements under Part VI.D are contained in **Table 15**.

Table 15. Required Data to Track for New and Redevelopment Projects per Part VI.D.7.d.iv.(1)(a)

New Development and Redevelopment Data, Per Part VI.D.7.d.iv.(1)(a)	
✓ Municipal Project ID	✓ Maintenance Records
✓ State Waste Discharge Identification Number	✓ Inspection Date(s)
✓ Project Acreage	✓ Inspection Summary(ies)
✓ BMP Type and Description	✓ Corrective Action(s)
✓ BMP Location (coordinates)	✓ Date Certificate of Occupancy Issued
✓ Date of Acceptance	✓ Replacement or Repair Date
✓ Date of Maintenance Agreement	

9.2.2 Reporting

Reporting requirements pertaining to new development and redevelopment are prescribed in Part VI.D.7 and in the MRP. The Permittees may identify and collect additional data as necessary through the land development process to facilitate annual reporting. Annual reporting requirements include:

- A summary of total offsite project funds raised to date and a description (including location, general design concept, volume of water expected to be retained, and total estimated budget) of all pending public offsite projects. [Part VI.D.7.c.iii.(5)(f)]
- A list of mitigation project descriptions and estimated pollutant and flow reduction analyses. [Part VI.D.7.c.vi]
- A comparison of the expected aggregate results of alternative compliance projects to the results that would otherwise have been achieved by retaining on site the stormwater quality design volume. (within four years of Order adoption) [Part VI.D.7.c.vi]
- Estimated cumulative change in percent effective impervious area (EIA) since the effective date of the Order and, if possible, the estimated change in stormwater runoff volume during the 85^{th} percentile storm event. [Attachment E.XVIII.A.1.a]
- Summary of the new development and redevelopment projects constructed within the Permittee’s jurisdictional area during the reporting year. [Attachment E.XVIII.A.1.b]
- Summary of retrofit projects that reduced or disconnected impervious area from the MS4 during the reporting year. [Attachment E.XVIII.A.1.c]
- Summary of other projects designed to intercept stormwater runoff prior to discharge to the MS4 during the reporting year. [Attachment E.XVIII.A.1.d]
- Provide an estimate of the total runoff volume retained onsite by the implemented projects (new and redevelopment, retrofits, and others). [Attachment E.XVIII.A.1.e]
- Summary of riparian buffer/wetland restoration projects completed during the reporting year. For riparian buffers include width, length, and vegetation type; for wetland include acres restored, enhanced, or created. [Attachment E.XVIII.A.1.g]
- Where control measures were designed to reduce impervious cover or stormwater peak flow and flow duration, provide hydrographs or flow data of pre- and post-control activity for the 85^{th} percentile, 24-hour rain event, if available. [Attachment E.XVIII.A.2.c]

9.2.3 Information Sharing

Data consistency within a jurisdiction and across jurisdictions within the watershed is critical to facilitate compilation, assessment, and reporting of data and findings. A data template has been developed with defined data entry fields to facilitate consistent data collection. The data template has been reviewed and refined by the watershed Permittees and will be implemented in each jurisdiction as appropriate. Where possible, data fields that are added to software programs in use within departments will adhere to these protocols. At a minimum, when data is compiled for a jurisdiction prior to reporting, the data will be collected according to these specified formats. Standardized data collection will facilitate analysis and reporting between jurisdictions (i.e., at the watershed scale). Specific data fields and formats are provided in **Table 16**.

Table 16. Standard Data Formats

Data (Units)	Standard Format
Name of the Project (None)	Text Field (1-100 characters)
Name of the Developer (None)	Text Field (1-100 characters)
Project location and map (None)	APN (XXX-XXX-XX-XX) Street Address (Text Field 1-100 Characters) Jurisdiction (Pomona, La Verne, San Dimas, Claremont)
Date of Certificate of Occupancy (None)	MM/DD/YYYY
85th percentile storm event for the project design (inches per 24 hours)	Numeric (0.01 – 5)
95th percentile storm event for projects draining to natural water bodies (inches per 24 hours)	Numeric (0.01 – 5)
Other design criteria required to meet hydromodification requirements for drainages to natural water bodies (none)	Text Field (1-100 characters)
Project design storm (inches per 24 hours)	Numeric (0.01 – 5)
Project design storm volume (gallons(1) or MGD)	Numeric (0.1 – 1,000,000,000)
Percent of design storm volume to be retained onsite (percent)	Numeric (0 – 100)
Design volume for water quality mitigation treatment BMPs (gallons(1) or MGD)	Numeric (0.1 – 1,000,000,000)
One year, one hour storm intensity for flow-through treatment BMPs (inches per hour)	Numeric (0.01 – 20)
Percent of design storm volume to be infiltrated at an offsite mitigation or groundwater replenishment site (percent)	Numeric (0 – 100)
Percent of design storm volume to be retained or treated with biofiltration at an offsite retrofit project (percent)	Numeric (0 – 100)
Location and maps of offsite mitigation, groundwater replenishment, or retrofit sites (none)	APN (XXX-XXX-XX-XX) Street Address (Text Field 1-100 Characters) Jurisdiction (Pomona, La Verne, San Dimas, Claremont)
Documentation of issuance of requirements to the developer (none)	MM/DD/YYYY

1. Permit specifies gallons or million gallons per day (MGD), recommend cubic feet

9.3 REGIONAL STUDIES

Only one regional study is identified in the MRP: Southern California SMC. The Southern California SMC is a collaborative effort between all of the Phase I MS4 NPDES Permittees and NPDES regulatory agencies in Southern California. The Southern California Coastal Water Research Project (SCCWRP) oversees the SMC.

9.3.1 Program Objectives

The goal of the SMC is to develop technical information necessary to better understand stormwater mechanisms and impacts, and develop tools to effectively and efficiently improve stormwater decision-making. The bioassessments are structured to occur in cycles of five years.

Sampling under the latest cycle concluded in 2013. The next five-year cycle is scheduled to begin in 2015, with additional special study monitoring scheduled to occur in 2014.

9.3.2 Regional Study Participation

The LACFCD will continue to participate in the Regional Watershed Monitoring Program (Bioassessment Program) being managed by the Southern California Stormwater Monitoring Coalition (SMC). The LACFCD will contribute necessary resources to implement the bioassessment monitoring requirement of the MS4 Permit on behalf of all permittees in Los Angeles County during the current permit cycle. Initiated in 2008, the SMC's Regional Bioassessment Program is designed to run over a five-year cycle. Monitoring under the first cycle concluded in 2013, with reporting of findings and additional special studies planned to occur in 2014. SMC, including LACFCD, is currently working on designing the bioassessment monitoring program for the next five-year cycle, which is scheduled to run from 2015 to 2019.

9.4 NON-CIMP MONITORING DATA

Water quality data collected through other monitoring programs (e.g., NPDES POTW) in the watershed will be incorporated to the extent practicable. The extent practicable will be dictated by the cost of gathering and compiling information from outside programs. Data reported by these entities will be evaluated for suitability for inclusion in the CIMP database. If the data are deemed to be suitable it will be included in the database described in the following element.

10 Reporting and Compliance Evaluation

Attachment E outlines the monitoring and reporting requirements from the MRP. Annual monitoring reports are required to be submitted by December 15 of every year. The annual reports will cover the monitoring period of July 1 through June 30. Additionally, the MRP specifies semi-annual, electronic submittal of receiving water and outfall monitoring data. To fulfill this requirement the monitoring year will be split as follows:

Table 17. Receiving Water and Outfall Monitoring Electronic Data Submittal Schedule

Monitoring Period	Data Submittal
July 1 through December 31	By June 15th of the following year
January 1 through June 30	By December 15th, included with the Annual Monitoring Report

The annual monitoring reports must include:

- Event summaries
- Analytical results
- Assessment of effectiveness of control measures
- Compliance report
- Adaptive management strategies and proposed modifications to the CIMP

The compliance evaluation will be conducted as outlined in **Attachment E**. However, the analysis will also take into consideration the relationship between the types of monitoring and the pathways for determining compliance outlined in the permit. As a result, while the Mass

Emission station will serve to help evaluate the receiving water objectives and support an understanding of potential impacts associated with MS4 discharges, an exceedance of a receiving water limitation at a receiving water site does not on its own represent an exceedance of a receiving water limitation that was caused by or contributed to by MS4 discharges as these sites also receive runoff from non-MS4 sources, including open space and other permitted discharges. Additionally, an exceedance at an outfall location when the corresponding downstream receiving water location is in compliance with the water quality objectives and RWLs does not constitute an exceedance of a WQBEL. Finally, reporting of compliance will be accomplished by evaluating the data per permit condition VI.E.2.b. The Permittees will be considered in compliance if any of the following conditions are met:

1. There are no violations of the final water quality-based effluent limitation for the specific pollutant at the Permittee's applicable MS4 outfall(s);
2. There are no exceedances of applicable receiving water limitation for the specific pollutant in the receiving water(s) at, or downstream of, the Permittee's outfall(s);
3. There is no direct or indirect discharge from the Permittee's MS4 to the receiving water during the time period subject to the water quality-based effluent limitation and/or receiving water limitation for the pollutant(s) associated with a specific TMDL; or
4. In drainage areas where Permittees are implementing an EWMP, (i) all non-storm water and (ii) all storm water runoff up to and including the volume equivalent to the 85^{th} percentile, 24-hour event is retained for the drainage area tributary to the applicable receiving water.

In addition, evaluation of compliance will consider the requirements in the Bacteria TMDL, as follows. Responsible jurisdictions and agencies shall assess compliance at the outfall monitoring sites identified in the implementation plan (included as stormwater/NSW TMDL outfall sites in the CIMP). Compliance shall be based on the allowable number of exceedance days, except in wet-weather, compliance can alternatively be based on an allowable load. Responsible jurisdictions and agencies must also assess compliance at in-stream monitoring sites. If the number of exceedance days is greater than the allowable number of exceedance days, then the responsible jurisdictions and agencies shall conduct additional outfall monitoring, beyond the routine outfall monitoring proposed in the implementation plan. If the collective outfall monitoring shows attainment of WLAs, then MS4 discharges shall not be held responsible for in-stream exceedances for this time period.

Section 11 includes procedures for conducting additional outfall monitoring if needed per the Bacteria TMDL.

11 Adaptive Management

The adaptive management process will be utilized on an annual basis to evaluate the CIMP and update the monitoring requirements as necessary. As noted in the CIMP, several monitoring elements are dynamic and may require modifications to the monitoring sites, schedule, frequency or parameters. In particular, the non-stormwater screening program and the toxicity monitoring will likely generate changes that need to be incorporated. This section lays out a range of possible modifications to the CIMP and the process for CIMP revision and update.

11.1 INTEGRATED MONITORING AND ASSESSMENT PROGRAM

The monitoring specified in the CIMP is in part dynamic. The specified monitoring program is based on analysis of existing data and the MRP requirements. As CIMP monitoring occurs, more information will be gathered that will require modifications to the procedures outlined in the CIMP. Every year, an evaluation of the CIMP will be conducted to identify potential modifications resulting from the following:

- Monitoring data demonstrates that water quality objectives are not being exceeded in the receiving waters.
- Source investigations determine that MS4 discharges are not a source of a constituent.
- Toxicity Identification Evaluations (TIEs) result in the identification of additional constituents that need to be monitored.
- Additional monitoring is necessary to characterize sources of a receiving water limitation exceedance, including evaluation of upstream receiving water monitoring, if needed.
- Additional outfall monitoring is needed in response to a bacteria receiving water limitation exceedance.
- Additional non-stormwater outfall sites need to be included.
- Monitoring data demonstrates that water quality objectives are not being exceeded in the receiving waters.

The results from the monitoring are meant to tie into the EWMP as feedback for the water quality changes resulting from control measures implemented by the Group Members. So additional changes may be considered during the evaluation based on the control measure implementation needs.

Should an exceedance of a receiving water limitation for E. coli be observed after the effective date of the final limitations (2021 for dry weather and 2029 for wet weather), additional outfall monitoring will be conducted per the requirements in the Bacteria TMDL. Because implementation of the non-stormwater screening program will be ongoing and numerous outfall locations may be monitored as a result of this program, additional outfall monitoring specific to the Bacteria TMDL requirements may not be needed. Should the USCRWMG decide additional monitoring is needed (for example during wet weather), the identification of additional outfalls will be decided during the CIMP revision process, when appropriate. Monitoring will be conducted in outfalls that drain to the reach where the exceedances occurred under the same conditions (i.e. wet or dry) for up to two events to determine whether the MS4 discharges are causing or contributing to the exceedances.

11.2 CIMP REVISION PROCESS

The CIMP identifies a number of procedures that will likely result in required changes to the monitoring program. However, since many of those potential changes are identified in the CIMP, it should not be necessary to get Regional Water Board approval of modifications already considered in the CIMP to ensure timely implementation of appropriate modifications to monitoring. These changes are outlined in this section. Changes identified in this section will be discussed in the annual report and implemented starting no later than the first CIMP event of the next monitoring year (i.e. the first event after July 1 of the year following the annual report submittal).

1. Adding constituents, increasing monitoring frequency, or adding sites as a result of any requirements in the MRP (e.g. TIE results or significant NSW outfall monitoring), procedures outlined in the CIMP or to further support meeting the monitoring objectives.
2. Discontinuing monitoring for Table E-2 constituents that are not identified as a water quality priority and are not detected at levels above relevant water quality objectives in the first year of monitoring.
3. Continue monitoring for any Table E-2 constituents that have exceedances during the first year at the frequency of 3 wet and 2 dry events, annually, as specified in **Table 10**. This change would begin immediately following the first monitoring year.
4. Discontinuing monitoring of any non-TMDL constituent at a specified site if:
    a. data collected are sufficient to support 303(d) delisting.
    b. there are two years with no exceedances of non-303(d) listed constituents observed for the same condition (i.e., wet or dry weather).
5. Changing the monitoring procedure from grabs to manual composite or automated sampling.
6. Modifying methods for consistency with EPA method requirements or to achieve lower detection limits.
7. Changing analytical laboratories.
8. Relocating any outfall monitoring locations determined to be not representative of MS4 discharges in the EWMP area (for reasons other than the observed water quality) or because monitoring at the site is not feasible.
9. Implementing the changes associated with conducting at least one re-assessment of the NSW Outfall Program during the Permit term.
10. Modifications to sampling protocols resulting from coordination with other watershed monitoring programs.

Should additional modifications be identified that are not specified in this section that would be major changes to the approach (e.g. moving or removing a receiving water location), the modifications will be proposed in the annual report and in a separate letter to the Regional Water Board requesting Executive Officer approval of the change. Upon receipt of written approval from the Executive Officer, this CIMP will be updated and a revised CIMP will be provided to the Regional Board.

12 Schedule

A summary of the schedule for implementing the requirements of the CIMP, as proposed, is included in **Table 18**. Existing monitoring will continue to be conducted and beginning summer of 2014, dry weather screening of major outfalls will commence. Implementation of new monitoring programs and modifications to existing monitoring programs will be implemented beginning July 2015 or 90 days after the approval of the CIMP, whichever is later.

Table 18. CIMP Implementation Schedule

Monitoring Element	Schedule
Receiving Water Monitoring	July 2015 or 90 days after approval of CIMP by Executive Officer, whichever is later
First set of two stormwater/NSW TMDL outfall locations	July 2015 or 90 days after approval of CIMP by Executive Officer, whichever is later
Second set of two stormwater/NSW TMDL outfall locations	Within 1 year of initiation of CIMP monitoring
Third set of two stormwater/NSW TMDL outfall locations	Within 2 years of initiation of CIMP monitoring
Outfall screening	Screening process will begin summer 2014
NSW source investigation	Source investigations will be conducted for at least 25% of the significant NSW discharges by December 28, 2015 and 100% by December 20, 2017
Significant NSW outfall monitoring, if needed	Monitoring will begin the latest of the next dry weather CIMP monitoring event after completing a source investigation, within 90 days after completing the source investigation, or after the CIMP has been approved by the EO.

Attachment A: Watershed Management Plan Area Background

1 WATERSHED BACKGROUND

The following subsections summarize the hydrology, geographic boundaries, and existing monitoring programs in the watershed management area covered by the CIMP.

1.1 Enhanced Watershed Management Program Area Overview

The EWMP will address the portion of the upper Santa Clara River in Los Angeles County and the City of Santa Clarita that is regulated by the Los Angeles County MS4 NPDES Permit. State and federal lands, including the Angeles National Forest and the state parks lands, are outside Los Angeles County MS4 NPDES Permit regulation and therefore not included in the scope of the EWMP. The upper Santa Clara River watershed covered by the EWMP encompasses approximately 121,423 acres. The entire Santa Clara River Watershed is 1,045,764 acres, which includes the land area within Ventura County as well as national forest and state park land. Reaches 5, 6, 7, and 8 of the SCR receive drainage from the Upper Santa Clara River Watershed Management Group (USCRWMG) Permittees.

Receiving waters within the EWMP area include:

- Santa Clara River Reach 5, 6, 7, and 8;
- South Fork Santa Clara River;
- Agua Dulce Canyon Creek;
- Mint Canyon Creek;
- Bouquet Canyon Creek;
- Dry Canyon Creek;
- San Francisquito Canyon Creek;
- Castaic Creek; and
- Gorman Creek.

SCR Reach 4B is the receiving water immediately downstream of the EWMP area and is included as part of the EWMP process to evaluate potential downstream concerns. Although there are a number of lakes with 303(d) listings in the EWMP area, there are no MS4 discharges to those lakes, with the exception of Lake Elizabeth. As a result, only Lake Elizabeth is covered in the CIMP. Likewise, there are no MS4 discharges to the Los Angeles River (LAR) from the portion of the City of Santa Clarita located in the LAR watershed. As such, monitoring in the LAR is not proposed in the CIMP.

1.1.1 Participating Permittees

The participating Permittees in the USCRWMG include the County of Los Angeles, the Los Angeles County Flood Control District, and the City of Santa Clarita. These Permittees are collectively referred to as the Upper Santa Clara River Watershed Management Group (USCRWMG or Group Members). Although the Los Angeles County Flood Control District has MS4 facilities within the EWMP boundaries, it does not have jurisdiction over land use. Approximate land area and land use summaries for the Group Members are listed in **Table A-1**.

Table A-1. List of Group Members participating in the EWMP with land use summaries

		Percent of Jurisdiction(1)			
Jurisdiction	**Area (sq.mi.)**	**Res**	**Com/Ind**	**Ag/Nur**	**Open**
County of Los Angeles	363.7	11	7	2	80
Santa Clarita	61.7	33	16	1	50
All Cities	425.4	14	8	2	76

1 Land use classifications include: residential (Res), commercial and industrial (Com/Ind), agriculture and nursery (Ag/Nur), and open space (Open). Totals correspond to the percent of the total area considered in the EWMP

1.1.2 Geographic Boundaries

The EWMP area is primarily located in the Santa Clara River Valley within the northern section of Los Angeles County as shown on **Figure A-1.** The majority of the EWMP area is located within Santa Clara River Watershed Management Area (WMA); however the City of Santa Clarita is also including an extremely small rural and undeveloped area, 0.09 square miles (or 0.233 square kilometers) of the Los Angeles River watershed located within City limits. There are no storm drains, gutters, catch basins, or Municipal Separate Storm Sewer Systems (MS4s) in this location. When it rains, the single paved road sheds water by sheet-flow to the surrounding open areas.

Like the portion of the City of Santa Clarita in the Los Angeles River watershed, other areas within the City and County in the Santa Clara River watershed are rural and undeveloped, and do not have MS4 systems. While these areas are included in the EWMP as they are within the Permittees' jurisdictions, these areas do not have MS4 systems that generate discharges to receiving water bodies. In some cases, the areas are primarily natural open space.

The jurisdictional boundaries for the Group Members are shown on **Figure A-2** along with the major water bodies and reach breaks.

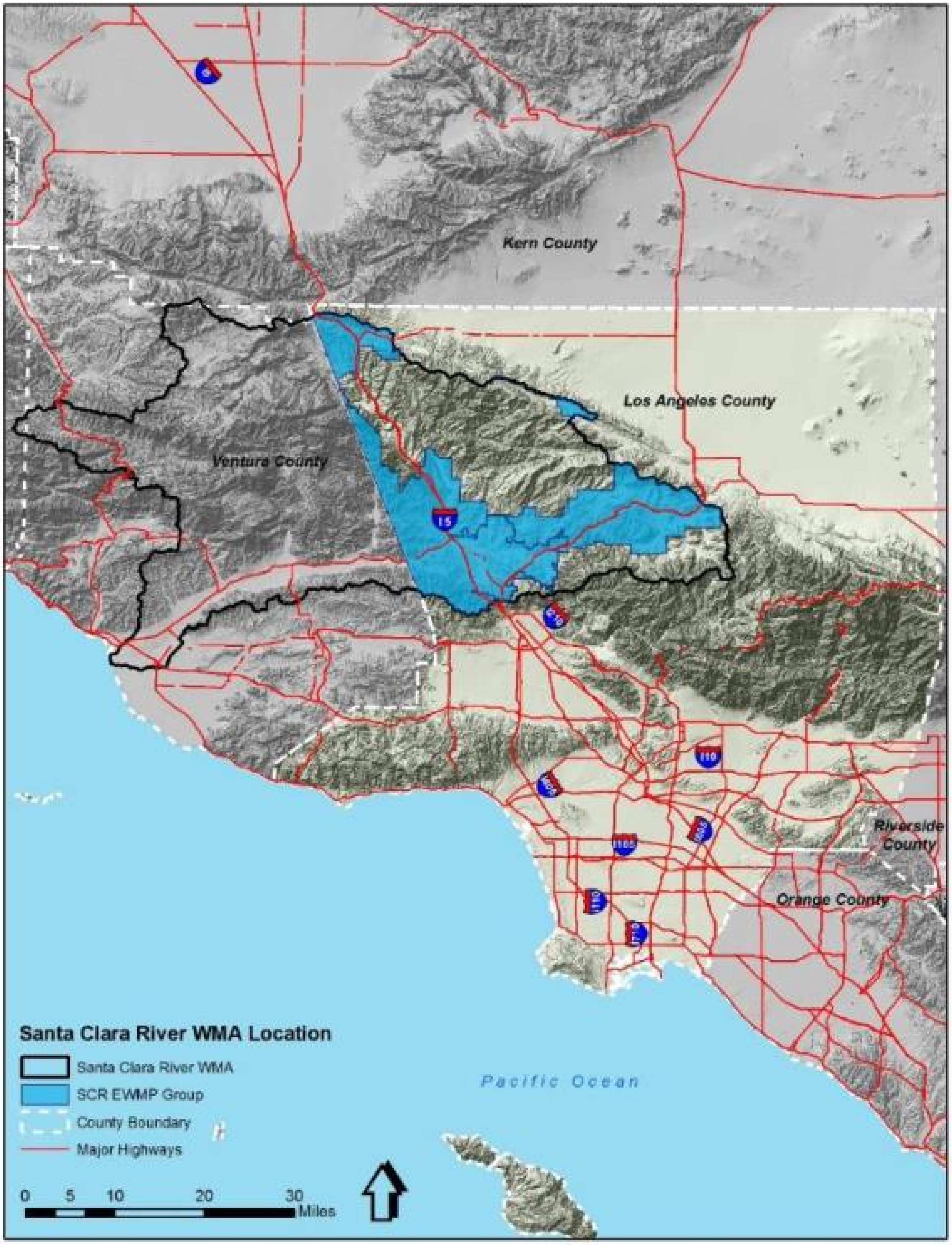


Figure A-1. Location of the EWMP Group within the Los Angeles Basin

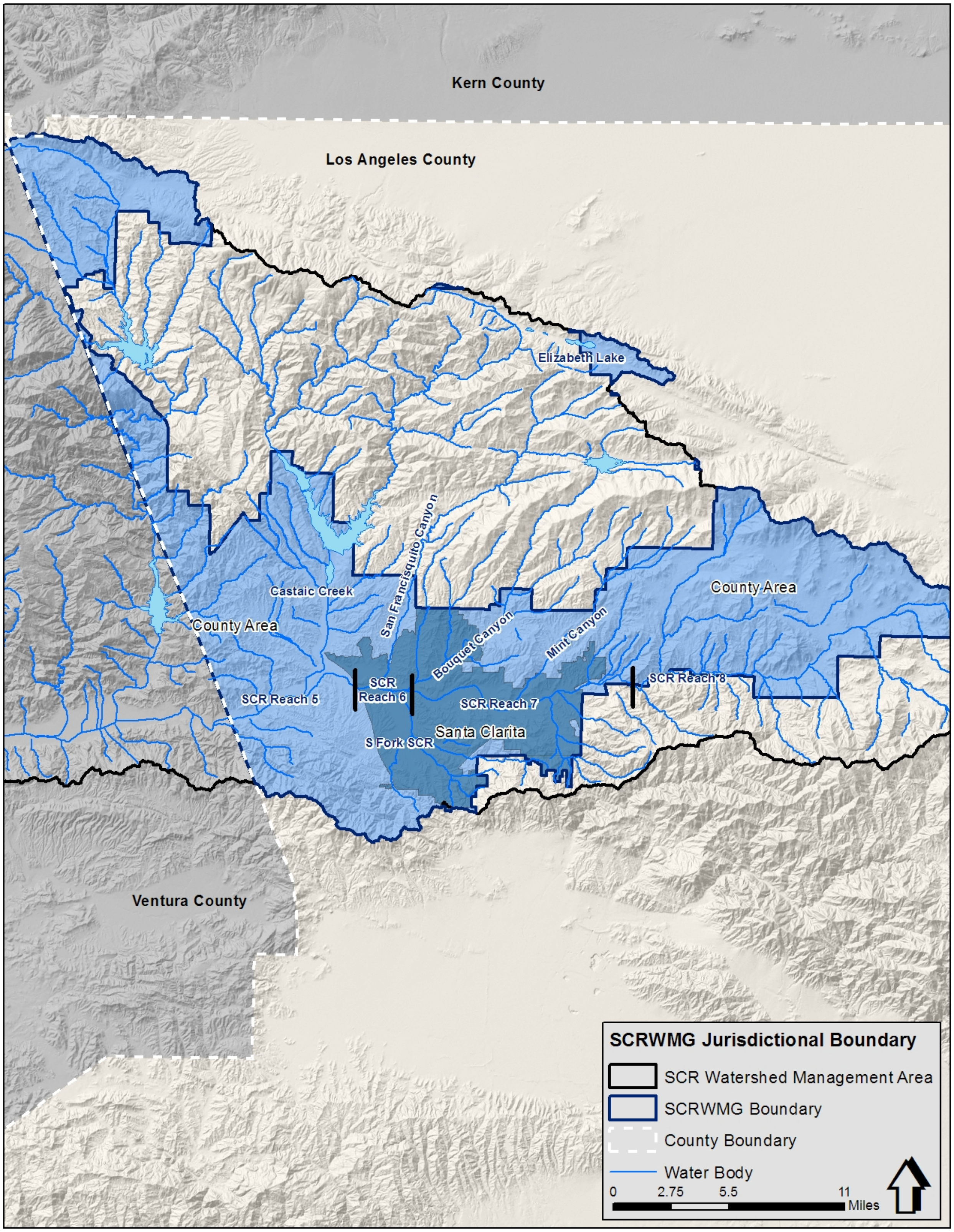


Figure A-2. Water Bodies and Geographic Boundary of the USCRWMG.

2 EXISTING MONITORING PROGRAMS

Existing watershed monitoring programs provide historical data and information that can be used to support site selection and identification of constituents for monitoring. The following subsections briefly describe the current state of existing monitoring programs relevant to the USCRWMG.

2.1 MS4 Permit Monitoring

There is one historical mass emission station that has been monitored to meet the requirements of previous MS4 Permits. The SCR Mass Emission Station, S29, is located in the river at the Old Road in Santa Clarita. The SCR at this location mostly has a soft bottom, which makes flow monitoring extremely difficult. The upstream tributary area is 411 square miles at this location; however, a significant amount of open space contributes the majority of the runoff that flows to S29. Sampling at the SCR mass emission station began during the 2002-2003 season.

In accordance with the requirements of the MRP in the previous MS4 Permit, wet weather samples have been generally collected during five storm events per year, and dry weather samples have been generally collected during two dry events per year. The types of monitored constituents includes:

- Chlorinated Pesticides
- Conventional Constituents (oil and grease, total phenols, cyanide, pH, and dissolved oxygen (DO))
- General Constituents (chloride, alkalinity, total suspended solids (TSS), turbidity, etc.)
- Herbicides
- Indicator Bacteria
- Metals
- Nutrients (ammonia, nitrate, phosphorus, etc.)
- Organophosphate Pesticides
- Polychlorinated Biphenyls (PCBs)
- Semi-volatile Organic Compounds (Acids)
- Semi-volatile Organic Compounds (Base/Neutral)
- Semi-Volatiles Organics (EPA 625)

2.2 LACSD Monitoring

LACSD is required to conduct effluent, receiving water, bioassessment, and watershed-wide, monitoring as part of the monitoring requirements associated with the Saugus and Valencia water reclamation plants (WRPs), which discharge to the SCR. The permitted flow and discharge locations for the Saugus and Valencia WRPs are listed in **Table A-2**.

Table A-1. Discharge Locations for the Saugus and Valencia WRPs

WRP	Permitted Flow (MGD)	Discharge Locations
Saugus	6.5	North Fork of the SCR immediately downstream of Bouquet Canyon Road
Valencia	21.6	SCR downstream of the Old Road

Receiving Water and Bioassessment Monitoring

An extensive number of constituents are monitored in the receiving waters upstream and downstream of the WRPs' discharges. The constituent classes include the following:

- Conventional Constituents
- Indicator Bacteria
- Nutrients
- Metals
- PCBs
- Organochlorine Pesticides
- Organophosphate Pesticides
- Salts

Bioassessment monitoring is also conducted at the WRPs' receiving water sites once per year during the fall. **Table A-3** summarizes the Saugus and Valencia WRPs receiving water and bioassessment monitoring locations. The constituents are monitored at various frequencies. The complete constituent list and monitoring frequency can be found in each of the WRPs' respective MRP.

Table A-2. WRP Monitoring Conducted at the Santa Clara River Monitoring Locations

WRP	Site	Location	Receiving Water	Bioassessment
Saugus	R-A	SCR: 300 ft upstream of discharge point No. 001 (Above Bouquet Cyn Rd)	X	X
	R-B	SCR: 300 ft downstream of discharge point No. 001 (Below Bouquet Cyn Rd)	X	X
Valencia	R-C	SCR: 300 ft upstream of discharge point No. 001	X	X
	R-D	SCR: 300 ft downstream of discharge point No. 001	X	X
	R-E	1.6 miles upstream of Chiquita Canyon Road	X	

2.3 Santa Clara River Watershed-wide Monitoring

Watershed-wide monitoring is proposed to be conducted in accordance with the *Santa Clara River Watershed-wide Monitoring Program and Implementation Plan* (SCR Watershed-wide Monitoring Program), dated December 15, 2011. This plan was developed based on the Los Angeles River Watershed Monitoring Program and San Gabriel River Regional Monitoring Program conducted by the Council for Watershed Health.

The SCR Watershed-wide Monitoring Program includes monitoring to address five core management questions related to priority beneficial uses:

1. What is the condition of streams in the watershed?
2. Are conditions at areas of unique interest getting better or worse?
3. Are receiving waters near discharges meeting water quality objectives?
4. Is it safe to swim?
5. Are locally caught fish safe to eat?

The monitoring conducted under the USCRWMG throughout the USCR WMA is summarized in **Table A-4**. Monitoring in the EWMP area through USCR EWMP largely consists of short term monitoring activities, with many sites only used for a single sampling event. Additionally, a limited number of constituents were tested at the sites.

Table A-3. San Clara River Watershed-wide Monitoring Program Monitoring Summary

Question	Approach	Sites	Indicators	Frequency
1	Randomized design for streams in watershed	6 randomly selected in each year	SMC: bioassessment, water chemistry, toxicity, in-stream physical habitat, California Rapid Assessment Method (CRAM)	Annually, in spring
2	Fixed stations	~8 high value	Riparian habitat (CRAM)	Annually, in summer
		1 trib confluence with mainstem 3 reference	Bioassessment, water chemistry, toxicity, Riparian habitat (CRAM)	Annually, in spring
3	Improve coordination Improve efficiency Reduce Overlap	Reduce weekly frequency to monthly Replace routine toxicity testing with adaptive testing linked to effluent test results		
4	Focus on high-use areas	2 lakes	*E. coli*	5 per month in swim season
		6 in river	*E. coli*	
		1 sentinel	*E. coli*	
5	Focus on Popular fishing sites Commonly caught species	7 lakes	Commonly caught fish at each location: Mercury, DDTs, PCBs	Once every 3 years on rotating schedule
	High-risk chemicals	4 river	Rainbow trout	Once every 10 years

2.4 Newhall Ranch Water Quality Monitoring

Newhall Land has prepared the Newhall Ranch Specific Plan (NRSP) Water Quality Monitoring Plan to satisfy requirements of the Clean Water Act Section 401 Water Quality Certification and Waste Discharge Requirements and the Spineflower Conservation Plan (Order No. R4-2012-0139) (WDR). The NRSP area incorporates approximately 12,000 acres within unincorporated Los Angeles County between Interstate 5 and the Los Angeles/ Ventura County line, just west of the City of Santa Clarita. The WDR requires specific stormdrain outfall and biological monitoring activities.

The NRSP includes two surface water monitoring sites upstream and downstream of the NRSP area and are intended to characterize changes in water quality as a result of development within the NRSP boundary. To satisfy WDR requirements, one representative outfall will be selected per village and will be representative of the overall land uses within the village. As additional villages and outfalls are constructed, the monitored outfall will be rotated on an annual basis. Surface and storm drain outfall monitoring will monitor for general chemistry parameters, salts, nutrients, indicator bacteria, metals, herbicides/pesticides, polycyclic aromatic hydrocarbons, and volatile organic compounds. Instream biological assessments, including habitat survey and monitoring of benthic macroinvertebrates, will also be conducted upstream and downstream of the NRSP area. **Table A-5** presents a summary of the proposed NRSP monitoring program.

Table A-4. Summary of Proposed Newhall Ranch Water Quality Monitoring

Monitoring Site	Monitoring Type	Event Type	Samples/ Year/ Location
NRSP-SW1	Surface Water	Wet Weather	3
	Biological Assessment	Dry Weather	1
NRSP-SW2	Surface Water	Wet Weather	3
Newhall Ranch WRP	Surface Water	Dry Weather	2
	Biological Assessment	Dry Weather	1
Various	Storm Drain Outfall	Wet Weather	3
Various	Storm Drain Outfall	Dry Weather	1

2.5 Existing Total Maximum Daily Load Monitoring Plans

The monitoring requirements contained in TMDL Monitoring Plans approved by the Regional Board EO were incorporated by reference into the Permit. However, the MRP states that the requirements of an approved TMDL Monitoring Plan may be modified by a CIMP that is subsequently approved by the Regional Board EO. The Responsible Parties for the Nitrogen TMDL submitted a Work Plan in 2006, which the Regional Board has yet to approve. The County of Los Angeles and the City of Santa Clarita submitted a Monitoring Plan for the Bacteria TMDL, but it has not been approved and monitoring is not scheduled to begin until after the submittal of the USCRWMG's CIMP. Regional Board staff have agreed that the Bacteria TMDL monitoring may be incorporated into the CIMP in a March 19, 2013 letter. There is only one approved TMDL Monitoring Plan: The County of Los Angeles Trash TMDL Monitoring and Reporting Plan for Lake Elizabeth, Munz Lake, and Lake Hughes (Trash TMDL Monitoring Plan). Tasks under this Monitoring Plan consist of assessing and monitoring trash in the lake and/or within the County of Los Angeles' land areas. The County has met the Trash TMDL compliance requirements by installing full capture devices.

3 TMDL Monitoring Requirements

One primary objective of the monitoring that will be conducted is fulfilling monitoring requirements established in TMDL Basin Plan Amendments (BPAs) and/or in Part XIX of the MRP, which establishes reporting requirements and associated monitoring requirements in association with adopted TMDLs in the region. Appendix L to the Permit lists the TMDLs directly applicable in the EWMP area. The applicable TMDLs are listed in **Table A-6**. The water bodies within the EWMP area with established TMDLs are highlighted in **Figure A-3**.

Table A-5. TMDLs Applicable to the EWMP Area.

TMDL	Effective Date or EPA Approval Date	Regional Board Resolution Number
Santa Clara River Nitrogen Compounds TMDL (Nitrogen TMDL)	3/23/2004	2003-011
TMDL for Chloride in the Upper Santa Clara River (Chloride TMDL)	5/4/2005	2004-004
Lake Elizabeth, Munz Lake, and Lake Hughes Trash TMDL (Trash TMDL)	3/6/2008	2007-009
TMDL for Indicator Bacteria in the Santa Clara River Estuary and Reaches 3, 5, 6, and 7 (Bacteria TMDL)	5/21/2012	R10-006

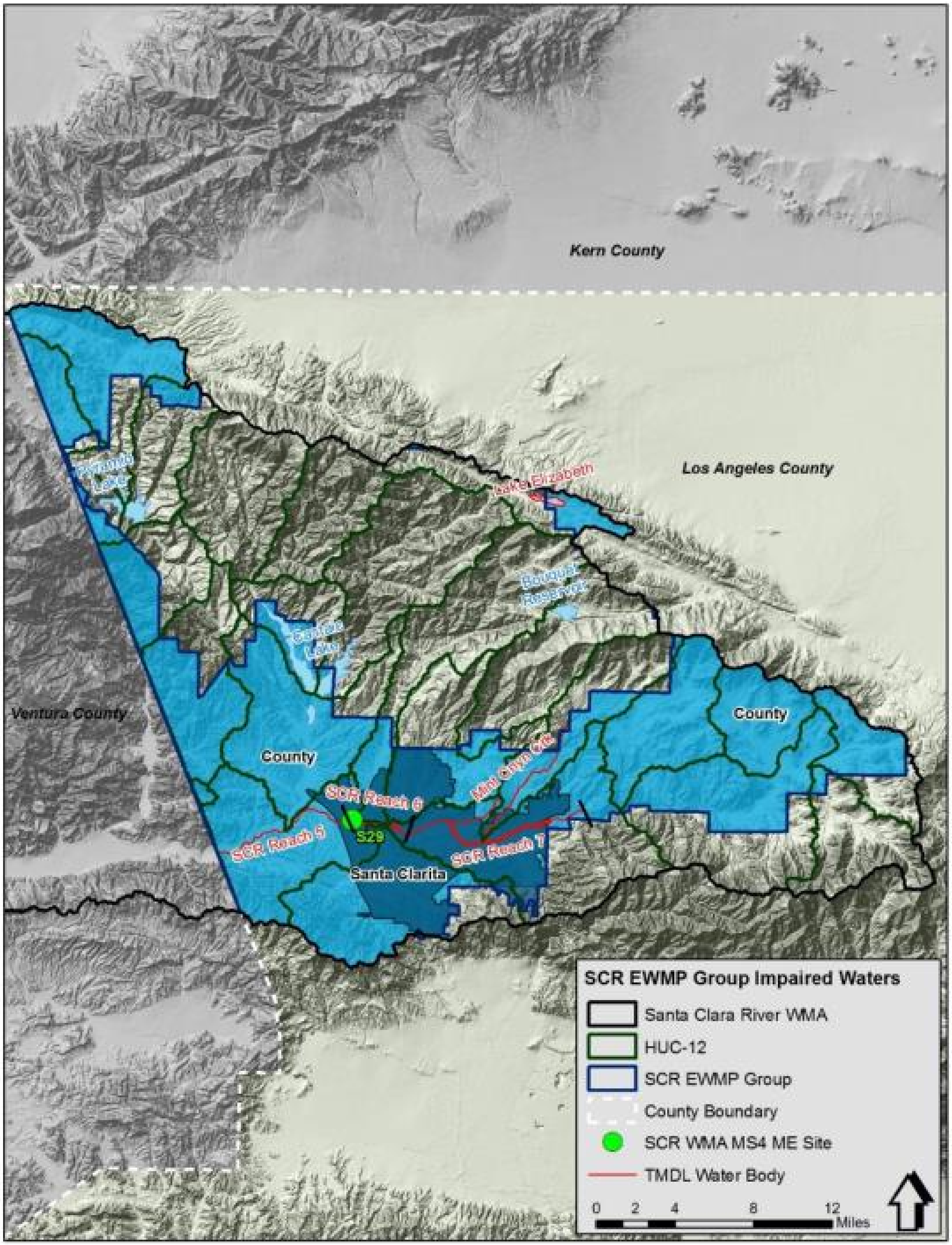


Figure A-3. TMDLs Within the EWMP Area

3.1 Santa Clara River Nitrogen Compounds TMDL

The Permit includes WQBELs for discharges to the Santa Clara River Reach 5 (Los Angeles Regional Basin Plan Reach Designation) for Total Ammonia and Nitrate-N plus Nitrite-N. Allocations and monitoring requirements are included for other reaches in the TMDL, but wasteload allocations and WQBELs only apply to Reach 5. A summary of the monitoring requirements identified in the TMDL BPA is presented in **Table A-7**. Compliance with the Nitrogen TMDL has been achieved in the Santa Clara River since the addition of nitrification/denitrification processes at the Saugus and Valencia Water Reclamation Plants. Per the TMDL Staff Report, the MS4 is considered a minor source of nitrogen compounds.

Table A-6. Summary of Nitrogen TMDL Monitoring Requirements applicable to the USCRWMG

Constituents	Frequency	Condition	Medium	Location
Total Ammonia, Nitrate-N + Nitrite-N	Not Specified	Dry Weather	Water	Santa Clara River Reach 5
		Wet Weather		

3.2 TMDL for Chloride in the Upper Santa Clara River

The Chloride TMDL applies to Reaches 4B, 5, 6, and 7, but the Permit only lists reach specific WQBELs for chloride in Reach 5 and 6 of the Santa Clara River. In addition to chloride, the TMDL also requires monitoring of total dissolved solids (TDS) and sulfate. A summary of the monitoring requirements identified in the TMDL is presented in **Table A-8**.

Table A-7. Summary of Chloride TMDL Monitoring Requirements applicable to the USCRWMG

Constituents	Frequency	Condition	Medium	Location(s)
Chloride, Total Dissolved Solids (TDS), and Sulfate	Not Specified	Dry weather	Water	Santa Clara River Reach 5, 6

3.3 Lake Elizabeth, Munz Lake, and Lake Hughes Trash TMDLs

For the Lake Elizabeth, Munz Lake, and Lake Hughes Trash TMDLs, Lake Elizabeth is the only TMDL waterbody to which USCRWMG members discharge. Compliance with the Lake Elizabeth Trash TMDL has been met through the installation of full capture devices on all conveyances that discharge to Lake Elizabeth at the MS4 catch basins. **Table A-9** provides information related to the six full capture devices installed in the Lake Elizabeth watershed and **Figure A-4.** shows the locations of the installed full capture devices.

Table A-8. Lake Elizabeth Watershed Full Capture Devices

FCD[1]	Location[2]	Cross Street[3]	FCD Owner[4]	FCD Maintainer[5]	Installation Date	CB Owner[6]	CB Maintainer[7]	O&M Information[8]
CPS	Sandrock Dr (SE)	Ranch Club Rd	CO	CO	3/16/2012	CO	CO	Once May-September & When CB ≥ 40% full
CPS	Ranch Club Rd (SE)	Sandrock Dr	CO	CO	3/16/2012	CO	CO	Once May-September & When CB ≥ 40% full
CPS	Ranch Club Rd (SW)	Sandrock Dr	CO	CO	3/16/2012	CO	CO	Once May-September & When CB ≥ 40% full
CPS	Montello Dr	Ranch Club	CO	CO	3/5/2013	CO	CO	Once May-September & When CB ≥ 40% full
CPS	Montello Dr	Ranch Club	CO	CO	3/5/2013	CO	CO	Once May-September & When CB ≥ 40% full
CPS	Elida Pl	Lesina Dr	CO	CO	3/12/2015	CO	CO	Once May-September & When CB ≥ 40% full

1. Certified full capture devices (FCD) installed are connector pipe screens (CPS).
2. Street where FCD is located and which corner it is located on, if applicable.
3. Name of nearest cross street.
4. FCD owned by the County of Los Angeles.
5. FCD maintained by the County of Los Angeles.
6. Catch basin (CB) owned by the County of Los Angeles.
7. CB maintained by the County of Los Angeles.
8. CB cleaned once between May and September and when the CB is greater than or equal to 40 percent full.

Figure A-5. Lake Elizabeth Trash Full Capture Devices

3.4 Santa Clara River Indicator Bacteria TMDL

The Bacteria TMDL states that compliance with interim WLAs must be assessed using in-stream monitoring while compliance with final WLAs must be assessed using in-stream and outfall monitoring. Outfall monitoring is not required until March 21, 2016. A summary of monitoring requirements is presented in **Table A-9.**

Table A-9. Summary of Bacteria TMDL Monitoring Requirements applicable to the USCRWMG

Constituents	Location	Compliance Monitoring Requirement	Medium	TMDL Reaches
E. coli	Outfalls	Compliance based on the allowable number of exceedance days, except in wet-weather, compliance can alternatively be based on an allowable load.	Water	Santa Clara River Reach 5, 6, and 7
	In-stream	Compliance based on the allowable number of exceedance days.		

3.5 Summary of TMDL Compliance Points

The City of Santa Clarita is identified in Attachment K as being a responsible party for the Los Angeles River Trash, Nitrogen Compounds and Related Effects, Metals and Bacteria TMDLs. However, as discussed in the geographic scope, the City has no MS4 discharges to the Los Angeles River. **Table A-10** lists the schedule and applicable interim and final Water Quality Based Effluent Limitations (WQBELs) and all other final WQBELs and receiving water limitations (RWLs) established by TMDLs and identified Attachment L of the Permit.

Implementation plans have not been developed for any of the TMDLs summarized in **Table A-10.** In the source assessments for the Nutrients TMDL and the Chloride TMDL for the Santa Clara River, the storm drain system is not the primary source of these pollutants. As a result, no implementation plan was required to be developed. For the Lake Elizabeth Trash TMDL, Los Angeles County is complying with the TMDL requirements by installing full capture devices. The bacteria TMDL is the only TMDL that requires the development of an implementation plan. However, the implementation plan is not due until March 2015. Rather than developing a separate implementation plan, the EWMP will serve as the implementation plan for the bacteria TMDL.

Table A-10. Interim and Final TMDL Compliance Milestones Applicable to the USCRWMG

TMDL	Waterbody	Constituent	Weather Condition	Schedule							Final WQBEL
				2012	2013	2014	2015	2016	2023	2029	
Salts	Santa Clara River Reaches 5, 6[2]	Chloride	Dry	Final[1]							100 mg/L
Bacteria	Santa Clara River Reaches 4B, 5, 6, 7	*E. coli*	Dry					Interim[4]	Final		235 MPN/ 100mL daily max, 126 MPN/100mL geo mean WQBEL, 5 exceedance days daily max, 126 geo mean RWL
			Wet					Interim[5]		Final	235 MPN/ 100mL daily max, 126 MPN/100mL geo mean WQBEL, 16 exceedance days daily max, 126 geo mean RWL
Nutrients	Santa Clara River Reaches 5[3]	Ammonia		Final[1]							1-hr average 5.2 mg/L 30 day average 1.75 mg/L
		Nitrate and Nitrite		Final[1]							30 day average 6.8 mg/L
Trash	Lake Elizabeth	Trash		Interim[6]	Interim[6]	Interim[6]	Interim[6]	Final			100% Full Capture

1. Final applicable on Effective Date of Permit.
2. TMDL applies to Reaches 4B, 5, 6, and 7, but permit only includes WQBELs for Reaches 5 and 6.
3. TMDL includes load allocations and monitoring requirements for other reaches, but wasteload allocations and WQBELs only apply to Reach 5.
4. Interim RWL of 17 allowable exceedance days.
5. Interim RWL of 61 allowable exceedance days.
6. Interim limits: 20% full capture in 2012, 40% full capture in 2013, 60% full capture in 2014, 80% full capture in 2015

4 WATER QUALITY PRIORITIES

Water quality priorities for the EWMP area are based on TMDLs, 303(d) list, and monitoring data. Based on available information and data analysis, WBPCs were classified in one of the three Permit defined categories. Category 1 if WBPCs are subject to established TMDLs, Category 2 if they are on the 303(d) List, or have sufficient exceedances to be listed, and Category 3 if there are observed exceedances but too infrequently to be listed.

4.1 Water Body-Pollutant Subject to TMDL

Appendix L in the Permit lists the TMDLs directly applicable to the EWMP area. WBPCs identified through TMDLs are included as Category 1. Additional information on the TMDLs is provided in the previous Section and in the table below.

Table A-11 Category 1 Waterbody-Pollutants with WQBELs

TMDL	Constituent	Santa Clara River Reach 5	Santa Clara River Reach 6	Santa Clara River Reach 7	Mint Canyon Reach 1	Elizabeth Lake
Salts	Chloride	E	E	E		
Bacteria	*E. coli*	R/E	R/E	R/E		
Nutrients	Ammonia	E	E			
	Nitrate and Nitrite	E	E		E(1)	
Trash	Trash					E

1. The Nitrogen TMDL addresses Mint Canyon; however there are no MS4 WLAs that apply.

R - Receiving water limit established by a TMDL.

E - Effluent limit established based on a TMDL.

4.2 Water Body-Pollutant on 2010 303(d) List

WBPCs on the State Water Resources Control Board's (SWRCB) 2010 Clean Water Act Section 303(d) List that are not already addressed by a TMDL or other action are included as Category 2. The 303(d) listed water bodies with MS4 discharges from the USCRWMG are presented in **Table A-12**. Additionally, all listings within or downstream of the USCRWMG area were identified and included in **Table A-16,** to acknowledge that discharges from upstream reaches could impact the listed area, particularly during wet weather. However, a constituent included in the table does not infer MS4 discharges from the EWMP area contribute to the downstream impairment. Additional analysis would need to be conducted to make that determination. The modeling conducted as part of the RAA analysis or optional special studies implemented through the CIMP would be alternatives allowing the USCR EWMP Group to make the determination.

Table A-12. Category 2 Water Body-Pollutants

Constituent	Santa Clara River Reach 5	Santa Clara River Reach 6	Santa Clara River Reach 7	Elizabeth Lake
Iron	L	L		
Copper		L		
Chlorpyrifos		L		
Diazinon		L		
Toxicity		L		
pH				L
Eutrophic				L
Organic Enrichment/ Low DO				L

L - Listed on 2010 303(d) List.

Available monitoring data for Category 2 WBPCs was compared against applicable water quality objectives to evaluate the potential for removing the constituents from the 303(d) list. Analysis revealed that sufficient monitoring data was available to support the delisting of iron in Santa Clara River Reach 5, and chlorpyrifos and diazinon in Santa Clara River Reach 6.

Monitoring data for iron in Santa Clara River Reach 5 was available between July 2009 and December 2012. The 215 samples were compared against EPA recommended criterion continuous concentration (CCC) criteria of 1,000 µg/L. CCC values are derived to be protective of aquatic life such that aquatic communities can be exposed indefinitely without resulting in an "unacceptable effect". Table 4.1 of the "2004 Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List" (Listing Policy) indicates that if eighteen or fewer exceedances are observed in 215 samples, the water body may be removed from the 303(d) list. Eleven samples were found to exceed the CCC criteria in the available data, supporting the recommendation to delist iron in Santa Clara River Reach 5.

Chlorpyrifos monitoring data in Santa Clara River Reach 6 was available between October 2002 and October 2012. The 74 samples were compared against EPA recommended CCC criteria of 0.041 µg/L. No samples were found to exceed the CCC criteria in the available data and the dataset exceeds the minimum number of samples necessary to support a delisting decision.

Diazinon monitoring data in Santa Clara River Reach 6 was available between October 2002 and October 2012. The 74 samples were compared to EPA recommended CCC criteria of 0.17 µg.L. Table 4.1 of the Listing Policy states that a maximum of six exceedances are allowed for a dataset of 74 samples to support the delisting of a water body. Of the 74 diazinon samples, three were found to exceed the EPA criteria, supporting delisting of diazinon in this reach of the Santa Clara River.

A summary of the available data is presented in the following table, supporting the delisting of these three constituents.

Table A–14. Summary of Available Data to Support Delisting of Iron, Chlorpyrifos, and Diazinon

	Santa Clara River Reach 5			Santa Clara River Reach 6		
Constituent	**NS**	**NE**	**ME**	**NS**	**NE**	**ME**
Iron	215	11	18			
Chlorpyrifos				74	0	6
Diazinon				74	3	6

NS – Number of Samples

NE – Number of Exceedances

ME – Maximum Number of Exceedances allowed to remove a water segment from the Section 303(d) List, as listed in Table 4.1 of the Listing Policy.

4.3 Water Body-Pollutant RWL Exceedances

Monitoring data for sites within the USCRWMG area was received from the following sources:

- Los Angeles Department of Public Works (LACDPW) provided long-term monitoring data from the Santa Clara River Mass Emission station S29.
- Los Angeles County Sanitation Districts (LACSD) provided long-term receiving water monitoring data.
- Regional Water Quality Control Board Region 4 Santa Clara River Surface Water Ambient Monitoring Program

The Municipal Separate Storm Sewer System (MS4) discharge from the EWMP area may cause or contribute to water quality issues downstream. It is not known at this time if the MS4 discharges from the EWMP area are contributing to water quality issues observed downstream. Identifying water quality priorities based on downstream conditions for consideration in the reasonable assurance analysis (RAA) and coordinated integrated monitoring plan (CIMP) provides regulatory coverage for the cities participating in the EWMP process. If the area is contributing to downstream exceedances of water quality objectives, the EWMP will provide the actions to appropriately control the discharges. During dry-weather, the river reaches in the EWMP area may be disconnected from the lower sections of the watershed due to the rapid infiltration over soft bottom channels. The monitoring performed under the CIMP will provide evidence as to whether the discharges are affecting the water quality downstream of the EWMP area. Site locations with available water quality data are shown on **Figure A-4**.

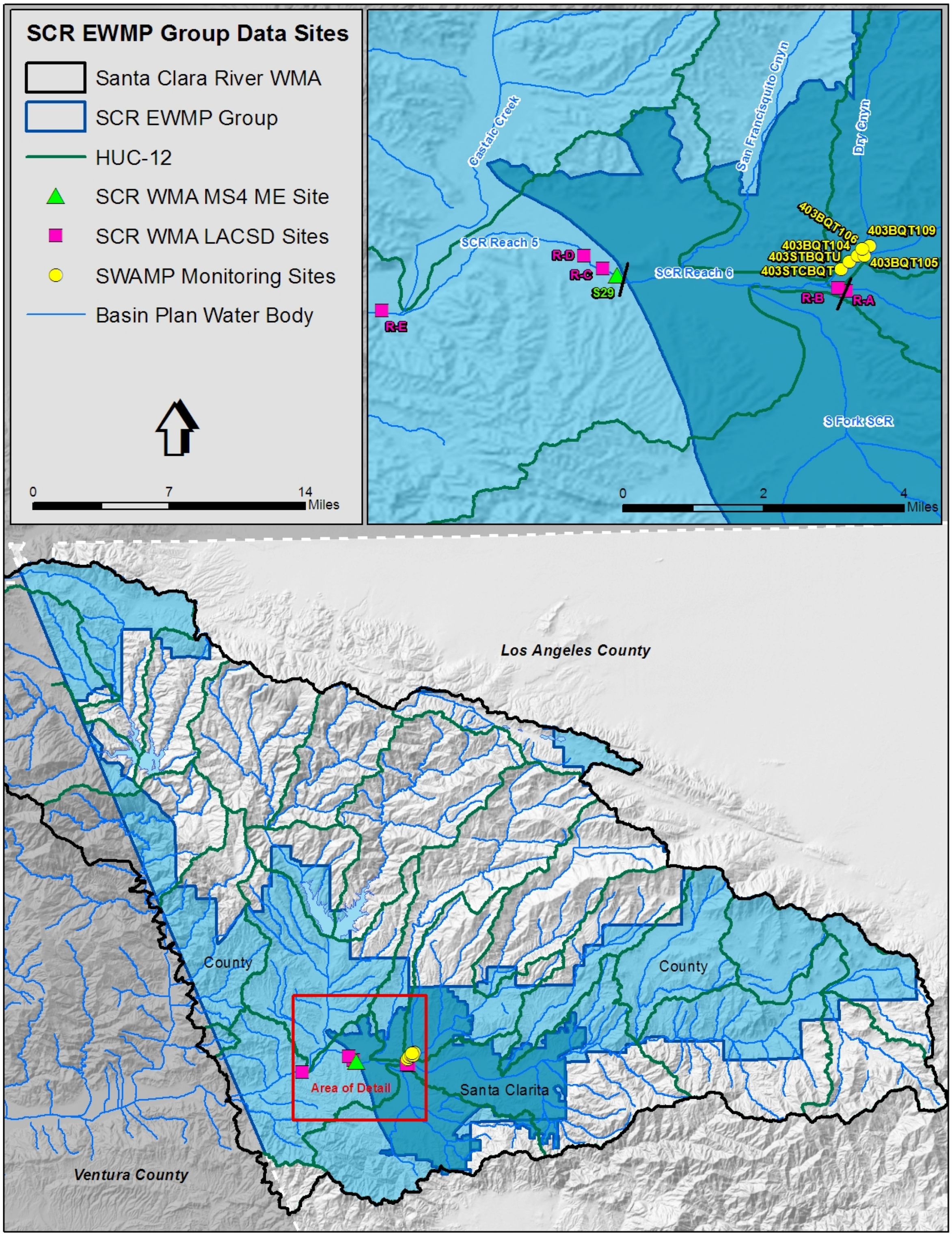


Figure A-6. Santa Clara River Watershed water bodies, Regional Board reaches, and site locations with available water quality data. Monitoring programs with available data include: LACFCD MS4 Mass Emission (ME), Surface Water Ambient Monitoring Program (SWAMP), and Los Angeles County Sanitation District (LACSD)

Monitoring data for sites within the Santa Clara River WMA found to be acceptable for use were analyzed to determine constituents exceeding water quality objectives. The available data were screened to ensure each record contained at minimum the following information: waterbody identification, an identifiable site location (i.e. GPS coordinates), date of sampling, name of constituent, minimum detection level, reporting level, the result (or in cases where the level was below detection level for the analysis, a flag indicating not detected), units of measurement, sample matrix, sample collection, and an indication of dissolved or total where appropriate.

The water quality data are compared to the WQBELs where available or the water quality objectives **(Table A-15)** to determine if the constituent exceeds the limitations as presented in **Table A-16**.

Table A-15 Applicable WQBELs or Water Quality Objectives for Constituents with Detections or Exceedances by Reach

Constituent	Santa Clara Reach 4B	Santa Clara Reach 5	Santa Clara Reach 6	Santa Clara Reach 7
Bis(2-ethylhexyl)Phthalate		5.9 µg/L	5.9 µg/L	
Chloride	100 mg/L	100 mg/L	100 mg/L	100 mg/L
Copper	HBC from CTR [1]	HBC from CTR [1]	HBC from CTR [1]	HBC from CTR [1]
Cyanide		5.2 µg/L	5.2 µg/L	5.2 µg/L
Diazinon		0.17 µg/L	0.17 µg/L	0.17 µg/L
Dissolved Oxygen	>5 mg/L	>5 mg/L	>5 mg/L	>5 mg/L
E. Coli		[2]	[2]	[2]
Iron	1 mg/L	1 mg/L	1 mg/L	1 mg/L
Mercury		0.051 µg/L	0.051 µg/L	0.051 µg/L
Nitrate and Nitrite [2]	5 mg/L	5 mg/L	10 mg/L	5 mg/L
pH	$6.5 \leq pH \leq 8.5$	$6.5 \leq pH \leq 8.5$	$6.5 \leq pH \leq 8.5$	$6.5 \leq pH \leq 8.5$
Selenium	5 µg/L	5 µg/L	5 µg/L	5 µg/L
TDS	1300 mg/L	1000 mg/L	1000 mg/L	800 mg/L
Zinc		HBC from CTR [1]	HBC from CTR [1]	HBC from CTR [1]

1. Hardness based aquatic life criteria (HBC) from the California Toxics Rule (CTR). Criteria calculated for each sample result based on the sample hardness.
2. Single sample objective is 235 MPN/100mL. Geometric mean objective is 126 MPN/100mL and compliance is calculated based on a 30-day geometric mean of at least 5 samples. If less than 5 samples are available, then the geometric mean is not calculated and the objectives are not exceeded.
3. Exceedances based on comparison to the WQBELs. Exceedances of the TMDL targets.

Table A-16. Exceedance of Water Quality Objectives

Constituent	Santa Clara Reach 4B			Santa Clara Reach 5			Santa Clara Reach 6			Santa Clara Reach 7			Bouquet Canyon Creek		
	NS	ND	NE	NS	ND	NE	NS	ND	NE	NS	ND	NE	NS	ND	NE
Bis(2-ethylhexyl)Phthalate				41	7	0	68	5	5						
Chloride	148	148	126	525	525	454	370	370	320	9	9	0			
Chlorpyrifos				39	0	0	74	0	0	1	0	0	26	8	8
Copper	1	1	0	215	215	2	146	135	33	2	2	1			
Cyanide				41	28	0	104	52	18	2	2	1			
Diazinon				39	0	0	74	11	3	1	0	0	26	26	25
Dissolved Oxygen	158	158	1	516	516	65	335	335	81	9	9	1			
E. Coli [1]				516	454	46	172	27	0	9	9	9			
Iron	1	1	0	215	203	11	194	149	42	4	4	3			
Mercury				215	96	5	146	16	4	2	2	1			
Nitrate-N + Nitrite-N [2]	30	30	0	923	923	1	414	414	0	16	16	0			
pH	169	169	0	516	516	0	328	328	1	9	9	7			
Selenium	1	1	0	215	215	1	146	88	4	2	2	0			
TDS	26	26	0	125	125	3	112	112	0	2	2	0			
Zinc				35	35	0	146	138	5	2	2	1			

NS – Number of samples

ND – Number of detections

NE – Number of exceedances

1. Exceedances calculated based on a 30-day geometric mean of at least 5 samples. If less than 5 samples are available, then the geometric mean is not calculated and the objectives are not exceeded.
2. Exceedances based on comparison to the WQBELs. Exceedances of the TMDL targets.

4.4 USCRWMG Water Quality Priorities

Subcategories were identified and created to refine the prioritization process. Those pollutants with measurements exceeding water quality objectives are further evaluated and categorized based on the frequency, timing, and magnitude of exceedances. The subcategories are listed in **Table A-17**. The WBPCs are placed in the respective subcategories in **Table A-18**.

Table A-17. Details for Water Body-Pollutant Combination Subcategories

Category	Water Body-Pollutant Combinations (WBPCs)	Description
1	**Category 1A:** WBPCs with past due or current Permit term TMDL deadlines with exceedances in the past 5 years.	WBPCs with TMDLs with past due or current Permit term interim and/or final limits. These pollutants are the highest priority for the current Permit term.
	Category 1B: WBPCs with TMDL deadlines beyond the Permit term and with exceedances in the past 5 years.	The Permit does not require the prioritization of TMDL interim and/or final deadlines outside of the Permit term or USEPA TMDLs, which do not have implementation schedules. To ensure EWMPs consider long term planning requirements and utilize the available compliance mechanisms these WBPCs should be considered during BMP planning and scheduling, and during CIMP development.
	Category 1C: WBPCs addressed in USEPA TMDL without a Regional Board Adopted Implementation Plan.	
	Category 1D: WBPCs with past due, current, or future Permit term TMDL deadlines without exceedances in the past 5 years.	WBPCs where specific actions may end up not being identified because recent exceedances have not been observed and specific actions may not be necessary. The CIMP should address these WBPCs to support future re-prioritization.
	Category 1E: WBPCs with TMDLs for which MS4 discharges are not causing or contributing.	The Permit requires prioritization of all constituents with established water quality based effluent limitations or receiving water limitations, regardless of source. WBPCs in this category are for reaches without MS4 discharges. While urban areas may be within the drainage area, no point source MS4 discharges to the waterbody. Therefore specific actions may not be necessary.
2	**Category 2A:** 303(d) Listed WBPCs or WBPCs that meet 303(d) Listing requirements with exceedances in the past 5 years.	WBPCs with confirmed impairment or exceedances of receiving water limitations. WBPCs in a similar class[1] as those with TMDLs are identified. WBPCs currently on the 303(d) List are differentiated from those that are not to support utilization of EWMP compliance mechanisms.
	Category 2B: 303(d) Listed WBPCs or WBPCs that meet 303(d) Listing requirements that are not a "pollutant"[2] (i.e., toxicity).	WBPCs where specific actions may not be identifiable because the cause of the impairment or exceedances is not resolved. Either routine monitoring or special studies identified in the CIMP should support identification of a "pollutant" linked to the impairment and re-prioritization in the future.
	Category 2C: 303(d) Listed WBPCs or WBPCs that meet 303(d) Listing requirements but have not exceeded in past 5 years.	WBPCs where specific actions for implementation may end up not being identified because recent exceedances have not been observed (and thus specific BMPs may not be necessary.) Pollutants that are in a similar class[1] as those with TMDLs are identified. Either routine monitoring or special studies identified in the CIMP should ensure these WBPCs are addressed to support re-prioritization in the future.
	Category 2D: 303(d) Listed WBPCs for which MS4 discharges are not causing or contributing	The Permit does not require prioritization of constituents for which data indicate water quality impairment in the receiving water, but where MS4 discharges are not causing or contributing to the impairment. Pollutants in this category are not attributable to MS4 sources and specific actions are likely not necessary.
3	**Category 3A:** All other WBPCs with exceedances in the past 5 years.	Pollutants that are in a similar class[1] as those with TMDLs are identified.
	Category 3B: All other WBPCs that are not a "pollutant"[2] (i.e., toxicity).	WBPCs where specific actions may not be identifiable because the cause of the impairment or exceedances is not resolved. Either routine monitoring or special studies identified in the CIMP should support identification of a "pollutant" linked to the impairment and re-prioritization in the future.
	Category 3C: All other WBPCs that have exceeded in the past 10 years, but not in past 5 years.	Pollutants that are in a similar class[1] as those with TMDLs are identified.
	Category 3D: WBPCs identified by the Group Members.	The Group Members may identify other WBPCs for consideration in EWMP planning.

1. Pollutants are considered in a similar class if they have similar fate and transport mechanisms, can be addressed via the same types of control measures, and within the same timeline already contemplated as part of the EWMP for the TMDL. (Permit pg. 49).
2. While pollutants may be contributing to the impairment, it currently is not possible to identify the *specific* pollutant/stressor.

Table A-18. Summary of Santa Clara River Watershed Water Body-Pollutant Categories.

Class[1]	Constituent	Santa Clara River Reach				Bouquet Canyon	Lake Elizabeth	Mint Canyon	Piru Creek	Munz Lake	Lake Hughes	Castaic Lake	Pyramid Lake	Los Angeles River
		4B	5	6	7									
Category 1A: WBPCs with past due or current term TMDL deadlines with exceedances in the past 5 years.														
Bacteria	E. Coli (dry)	I	I		I									
Salts	Chloride	F	F	F	F									
Category 1B: WBPCs with TMDL deadlines beyond the current Permit term and with exceedances in the past 5 years.														
Bacteria	E. Coli (wet and dry)	F	F		F									
Category 1D: WBPCs with past due or current term deadlines without exceedances in the past 5 years.														
Nutrients	Ammonia	F	F	F	F									
Nutrients	Nitrate and Nitrite	F	F	F	F									
Trash	Trash						F							
Bacteria	E. Coli (wet and dry)			I/F										
Category 1E: WBPCs with TMDLs for which MS4 discharges are not causing or contributing														
Trash	Trash									TMDL	TMDL			F
Nutrients	Ammonia													F
Nutrients	Nitrate and Nitrite							TMDL						F
Bacteria	E. Coli													I
Metals	Cadmium													I
Metals	Copper													I
Metals	Lead													I
Metals	Selenium													I
Metals	Zinc													I

Class[1]	Constituent	Santa Clara River Reach				Bouquet Canyon	Lake Elizabeth	Mint Canyon	Piru Creek	Munz Lake	Lake Hughes	Castaic Lake	Pyramid Lake	Los Angeles River
		4B	5	6	7									
Category 2A: 303(d) Listed WBPCs <u>with</u> exceedances in the past 5 years.														
Metals	Copper			303 (d)										
	Iron		D	303 (d)										
TBD	Cyanide			L										
Category 2B: 303(d) Listed WBPCs that are not a "pollutant"[3] (i.e., toxicity).														
TBD	Toxicity			303 (d)										
TBD	pH				L		303(d)							
TBD	Eutrophic						303(d)							
TBD	Organic Enrichment/Low DO						303(d)							
Category 2C: 303(d) Listed WBPCs <u>without</u> exceedances in past 5 years.														
Pesticides	Chlorpyrifos			D										
Pesticides	Diazinon			D										
Category 2D: 303(d) Listed WBPCs for which MS4 discharges are not causing or contributing														
Metals	Mercury											303(d)	303(d)	
TBD	Eutrophic									303(d)	303(d)			
TBD	Fish Kills										303(d)			
TBD	Odor										303(d)			
TBD	Algae										303(d)			
TBD	pH								303(d)					
Salts	Chloride								303(d)					

Class[1]	Constituent	Santa Clara River Reach				Bouquet Canyon	Lake Elizabeth	Mint Canyon	Piru Creek	Munz Lake	Lake Hughes	Castaic Lake	Pyramid Lake	Los Angeles River
		4B	5	6	7									
Category 3A: WBPCs <u>with</u> exceedances in the past 5 years.														
Metals	Copper		X		X									
	Mercury		X	X	X									
	Selenium			X										
	Zinc			X										
TBD	Cyanide				X									
Salts	TDS		X											
Category 3C: WBPCs <u>without</u> exceedances in past 5 years.														
TBD	Bis-2 Ethylhexyl phthalate			X										
Category 3D: Other EWMP Priorities														
Pesticides	Pyrethroids					X								

1. Pollutants are considered in a similar class if they have similar fate and transport mechanisms, can be addressed via the same types of control measures, and within the same timeline already contemplated as part of the Watershed Management Program for the TMDL.
2. Interim limits for dry E. Coli during permit term, interim limits for wet E. Coli past permit term, final limits for dry and wet past permit term.

I=Interim TMDL Effluent or Receiving Water Limit

F=Final TMDL Effluent or receiving water limit

D=303(d) listing that could now be delisted and has no exceedances in last 5 years

303(d)=Confirmed 303(d) Listing

L=WBPC that meets the listing criteria

TMDL=TMDL that does not contain MS4 allocations for the reach

TBD=To be determined– used for conditions (pH and dissolved oxygen) that are not pollutants, per se, or constituents where the linkage to another type of constituent will be further investigated during EWMP development.

Constituents may change subcategories as the monitoring progresses, source investigations occur, and BMP implementation begins. Constituents for which exceedances decrease over time will be removed from the priority list and moved to the monitoring priority categories; or, dropped from the priority list. If the frequency of constituent exceedances increases to a consistent level, for a constituent that is currently not a priority, then the constituent would be reevaluated using the prioritization procedure, likely increasing the priority of the constituent. Due to the natural rate of infiltration, the Santa Clara River and some of the tributaries are dry with the exception of storm flows. Future monitoring will be assessed to establish the disconnect between the upper and lower watershed during dry weather and minor storm events.

Attachment B: Monitoring Location Fact Sheets

Monitoring locations fact sheets are presented for the receiving water and stormwater outfall monitoring sites identified in **Section 4** of the CIMP. For each site, the monitoring location fact sheets consist of relevant information (e.g., coordinates), a general description, aerial satellite imagery, and a photograph. For the stormwater outfall locations, land use information and a map of the catchment area are also included.

1 Receiving Water Sites

The receiving water monitoring sites in the USCRWMG's EWMP area and the type of monitoring that will be conducted at each site are summarized in **Table B-1**. **Section 4** of the CIMP details the site selection process which resulted in the selection of the identified sites.

Table B-1. Summary of Proposed Receiving Water Monitoring Sites

		Coordinates		Monitoring Type		
Site ID	**Water Body**	**Latitude**	**Longitude**	**RWA**	**TMDL**	**Other**
SNTCLR_5_R-E	SCR Reach 5	34.41856	-118.63569		X	
SNTCLR_6_ME	SCR Reach 6	34.42611	-118.58583	X	X	
SNTCLR_7_R-A	SCR Reach 7	34.42403	-118.53956		X	

RWA – Receiving Water Assessment

1.1 Receiving Water Assessment Site

Waterbody Name	Waterbody Type	Site ID	Historical Site ID	Site Type	Latitude	Longitude
SCR Reach 6	Main Stem	SNTCLR_6_ME	MS4 ME S29	RWA, TMDL	34.42611	-118.58583

General Description: RWA and TMDL monitoring site located at the downstream end of Reach 6 at The Old Road and coincides with the S29 Mass Emission Station. This location is also upstream of the Valencia WRP's discharge location. The samples from this monitoring location will characterize the water quality of Reach 6, including approximately 80% of the discharge from the MS4 discharges.

SNTCLR_6_ME Aerial View

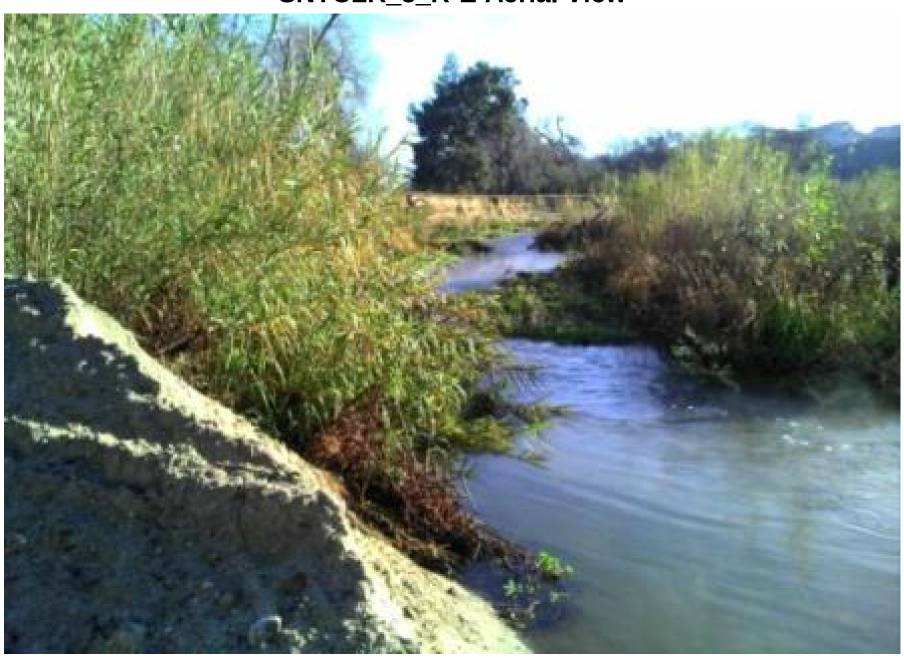
SNTCLR_6_ME Ground-Level View

1.2 Santa Clara River Reach 5 TMDL Site

Waterbody Name	Waterbody Type	Site ID	Historical Site ID	Site Type	Latitude	Longitude
SCR Reach 5	Main Stem	SNTCLR_5_R-E	LACSD R-E	TMDL	34.41856	-118.63569

General Description: TMDL monitoring site located downstream of the City approximately in the middle of Reach 5. This monitoring site would coincide with a current LACSD monitoring location, which is approximately three miles downstream of the Valencia WRP's discharge point. The samples from this monitoring site will characterize the water quality of Reach 5, including approximately 90% of the discharge from the urbanized areas of the USCRWMG (i.e., MS4 discharges).

SNTCLR_5_R-E Aerial View



SNTCLR_5_R-E Ground-Level View

1.3 Santa Clara River Reach 7 TMDL Site

Waterbody Name	Waterbody Type	Site ID	Historical Site ID	Site Type	Latitude	Longitude
SCR Reach 7	Main Stem	SNTCLR_7_R-A	LACSD R-A	TMDL	34.42403	-118.53956

General Description: TMDL monitoring site located at the downstream end of Reach 7, at a LACSD receiving water monitoring location for the Saugus WRP just upstream of the discharge point. The samples from this monitoring location will characterize the water quality of Reach 7 including approximately 40% of the MS4 discharges.

SNTCLR_7_R-A Aerial View

SNTCLR_7_R-A Ground-Level View

2 STORMWATER OUTFALL SITES

The stormwater outfall monitoring sites in the USCRWMG's EWMP area are summarized in **Table B-2**. Attachment D and **Section 4** of the CIMP details the process which resulted in the selection of the identified sites. From the outfall drainage area maps, some of the "smart growth" clustering of commercial and including multi-use land areas in the watershed is apparent. Additionally, the City continues to work to maintain a green belt around the City perimeter.

Table B-2. Summary of Proposed Storm Water Outfall Monitoring Sites

HUC-12	Jurisdiction	Drain Name	Size	Shape	Material	Latitude	Longitude
Lower Castaic Creek	County	PD 2443	60"	Square or Rectangle	Reinforced Conc. Box	34.49705	-118.61252
San Francisquito Canyon	City	MTD 1643	78"	Round	Reinforced Conc. Pipe	34.45319	-118.55551
Mint Canyon	County	PD 2516	60"	Round	Corrugated Metal Pipe	34.44048	-118.43074
Sand Canyon	City	PD 0494	78"	Round	Reinforced Conc. Pipe	34.40604	-118.47007
S Fork Santa Clara River	City	PD 0717	120"	Square or Rectangle	Reinforced Concrete Box	34.38176	-118.55110
Salt Canyon	City	MTD 1510	84"	Double Box	Reinforced Concrete Box	34.42398	-118.56321
Lake Elizabeth	County	Unknown (East) [1]	30"	Round	Reinforced Conc. Pipe	34.66196	-118.38712

1. Lake Elizabeth outfall site will be sampled to identify whether or not the MS4 contributes to the lake's 303(d) listing for eutrophic condition and is not a part of the permit required outfall monitoring. At the end of one year, a determination regarding the need to continue monitoring this outfall will be made.

2.1 Lower Castaic Creek PD 2443

HUC-12	Group Member	Drain Name	Size	Site Type	Latitude	Longitude
Lower Castaic Creek	County	PD 2443	60 inches	SW Outfall	34.49705	-118.61252

General Description: SW outfall monitoring site discharging to Castaic Creek just downstream of Lake Hughes Road. The PD 2443 drain monitoring site only receives drainage from the County. Primary land use types include: 45 percent residential, 37 percent commercial, and 18 percent open space.

PD 2443 Aerial View

PD 2443 Ground-Level View

Lower Castaic Creek PD 2443 Catchment Land Use

HUC-12			Outfall		
Residential	Commercial	Open	Residential	Commercial	Open
82%	13%	5%	82%	7%	12%

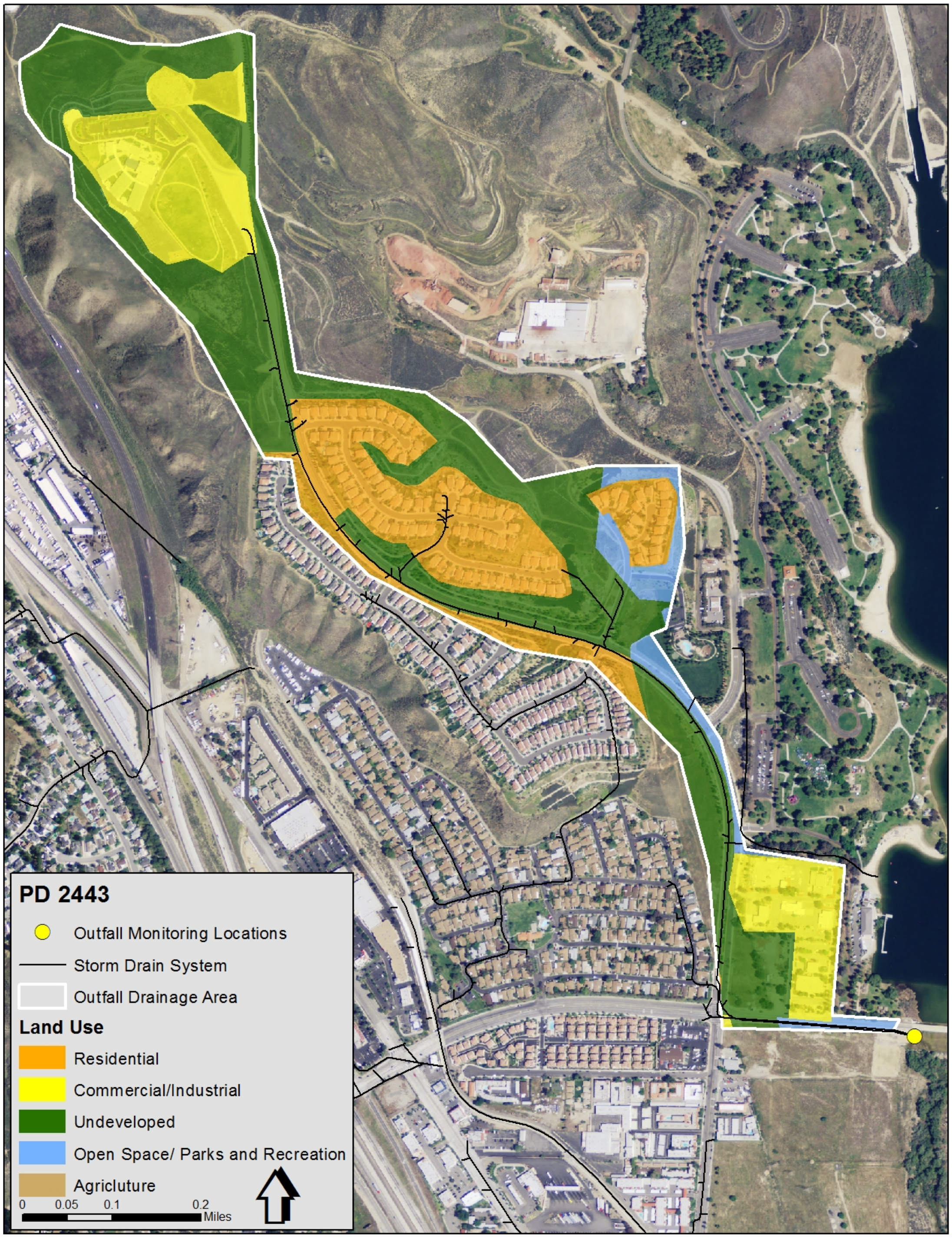


Figure B-1. Catchment Land Use for Lower Castaic Creek

2.2 San Francisquito Canyon MTD 1643

HUC-12	Group Member	Drain Name	Size	Site Type	Latitude	Longitude
San Francisquito Canyon	City	MTD 1643	78 inches	SW Outfall	34.45319	-118.55551

General Description: SW outfall monitoring site discharging to San Francisquito Canyon Creek between Copper Hill Drive and Decoro Drive. The MTD 1643 drain monitoring site only receives drainage from the City. Also, due to access restrictions at the point of discharge and the availability of an easily accessible manhole, the monitoring site is located at the nearest upstream manhole. Primary land use types include: 82 percent residential, 7 percent commercial/industrial, and 12 percent open space.

MTD 1643 Aerial View

MTD 1643 Ground-Level View

San Francisquito Canyon MTD 1643 Catchment Land Use

HUC-12			Outfall		
Residential	**Commercial**	**Open**	**Residential**	**Commercial**	**Open**
82%	13%	5%	82%	7%	12%

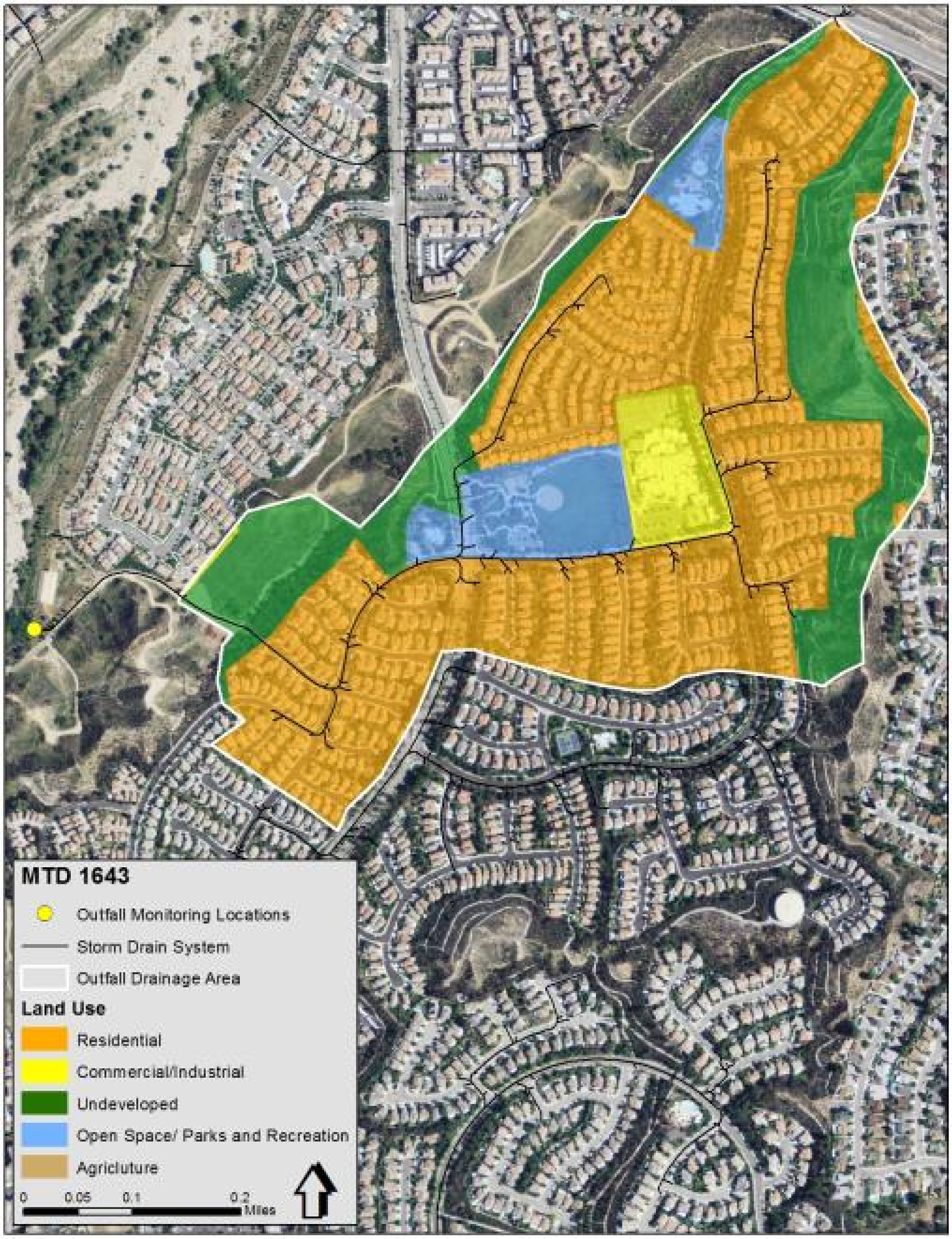


Figure B-2. Catchment Land Use for San Francisquito Canyon

2.3 Mint Canyon PD 2516

HUC-12	Group Member	Drain Name	Size	Site Type	Latitude	Longitude
Mint Canyon	County	PD 2516	60 inches	SW Outfall	34.44048	-118.43074

General Description: SW outfall monitoring site discharging to Mint Canyon just west of Sierra Highway near Ryan Lane. The PD 2516 drain monitoring site consists of two outlets and only receives drainage from the County. Primary land use types include: 68 percent residential, 32 percent commercial/industrial, and 0 percent open space.

PD 2516 Aerial View

PD 2516 Ground-Level View

Mint Canyon PD 2516 Catchment Land Use

HUC-12			Outfall		
Residential	Commercial	Open	Residential	Commercial	Open
78%	21%	1%	68%	32%	0%

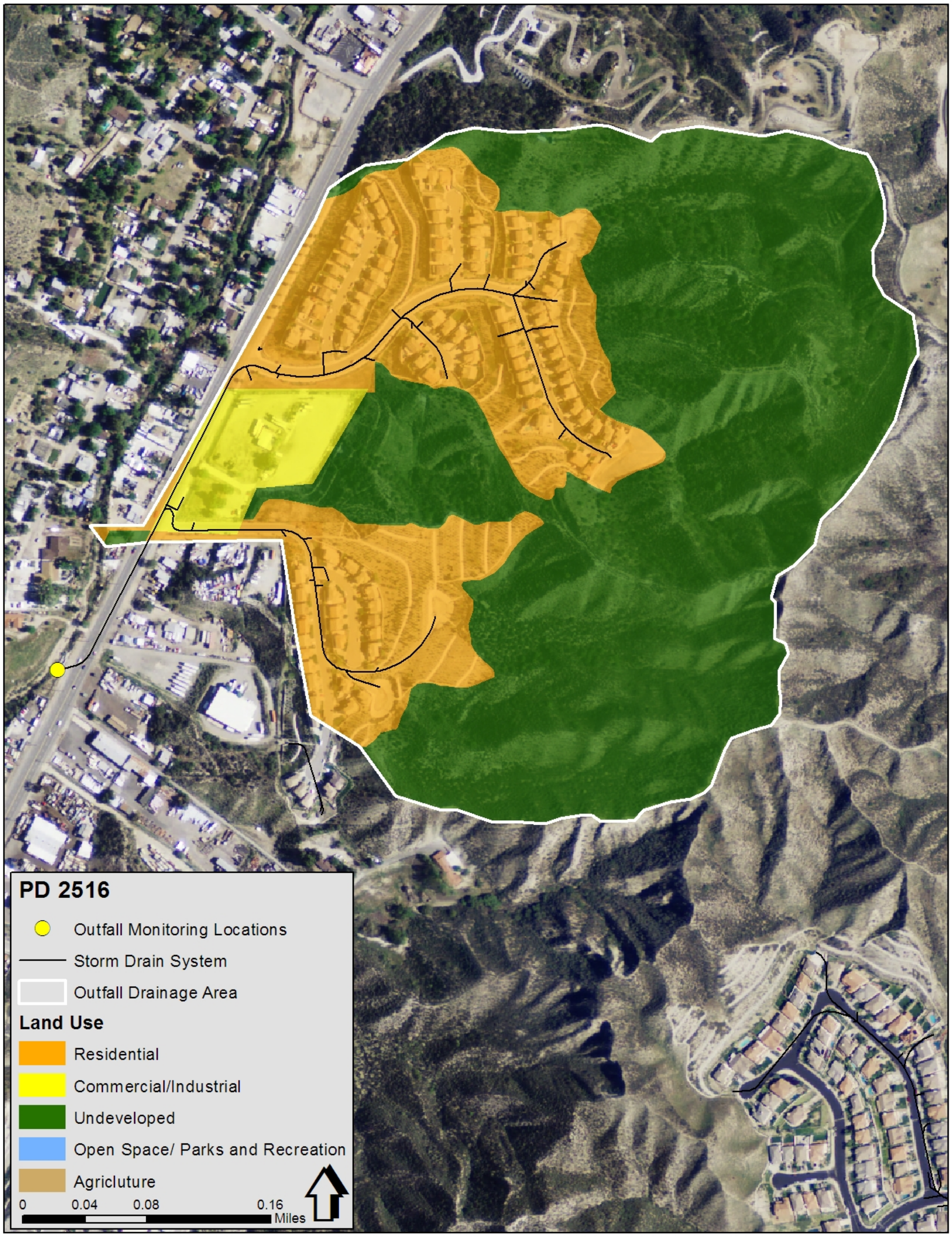


Figure B-3. Catchment Land Use for Mint Canyon

2.4 Sand Canyon PD 0494

HUC-12	Group Member	Drain Name	Size	Site Type	Latitude	Longitude
Sand Canyon	City	PD 0494	78 inches	SW Outfall	34.40604	-118.47007

General Description: SW outfall monitoring site discharging to an unnamed tributary to Santa Clara River Reach 7 and is located on Friendly Valley Golf Course which is privately owned and located near the intersection of Via Princesa and Sierra Highway. The PD 0494 drain monitoring site only receives drainage from the City. Primary land use types include: 88% residential; 12% commercial/industrial; and less than 1 percent open space.

PD 0494 Aerial View

PD 0494 Ground-Level View

Sand Canyon PD 0494 Catchment Land Use

HUC-12			Outfall		
Residential	**Commercial**	**Open**	**Residential**	**Commercial**	**Open**
75%	20%	6%	88%	11%	0%

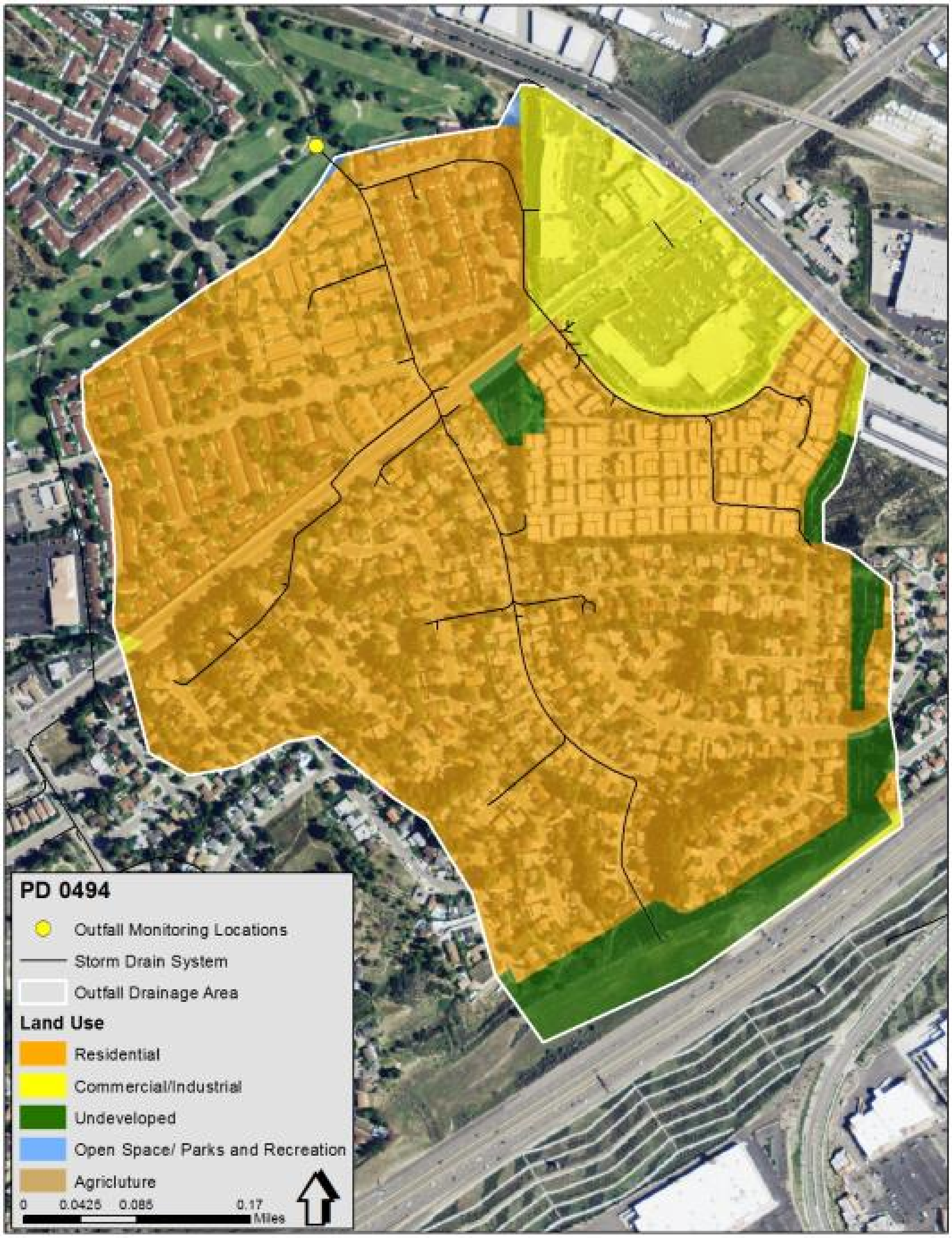


Figure B-4. Catchment Land Use for Sand Canyon

2.5 South Fork Santa Clara River PD 0717

HUC-12	Group Member	Drain Name	Size	Site Type	Latitude	Longitude
S Fork Santa Clara River	City	PD 0717	120 inches	SW Outfall	34.38176	-118.55110

General Description: SW outfall monitoring site discharging to the South Fork Santa Clara River between Lyons Avenue and Orchard Village Road. The PD 0717 drain monitoring site only receives drainage from the City. Primary land use types include: 83 percent residential, 9 percent commercial/industrial, and 8 percent open space.

PD 0717 Aerial View

PD 0717 Ground-Level View

S. Fork Santa Clara River PD 0717 Catchment Land Use

HUC-12			Outfall		
Residential	**Commercial**	**Open**	**Residential**	**Commercial**	**Open**
58%	35%	8%	83%	10%	8%

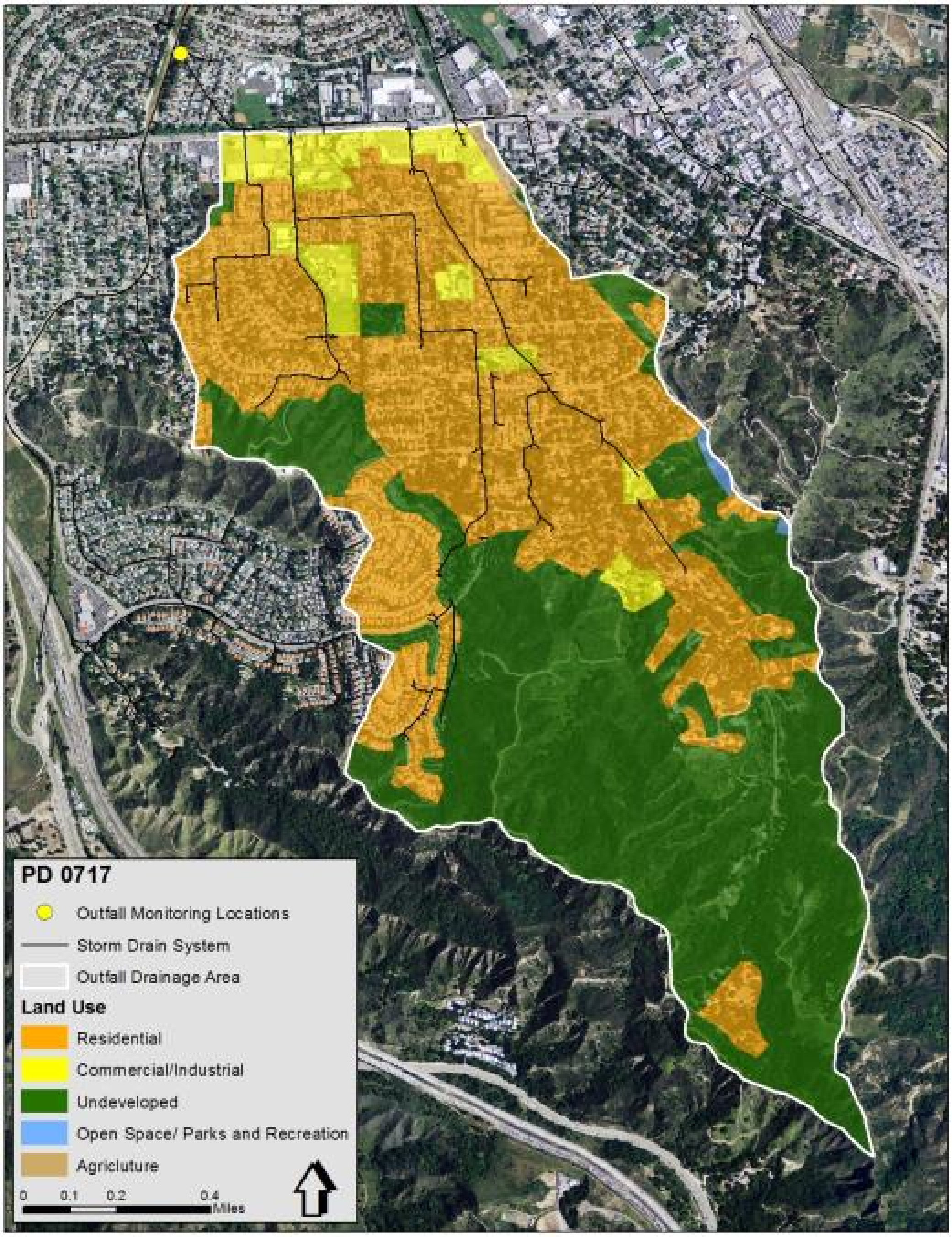


Figure B-5. Catchment Land Use for S. Fork Santa Clara River

2.6 Salt Canyon MTD 1510

HUC-12	Group Member	Drain Name	Size	Site Type	Latitude	Longitude
Salt Canyon	City	MTD 1510	84 inches	SW Outfall	34.42398	-118.56321

General Description: SW outfall monitoring site discharging just downstream of McBean Parkway to Santa Clara River Reach 6. The MTD 1510 drain monitoring site only receives drainage from the City. Also, due to risk associated with autosampling equipment being washed away during extreme flow events, monitoring would take place at the nearest upstream manhole. Primary land use types include: 57 percent residential, 41 percent commercial/industrial, and 2 percent open space.

MTD 1510 Aerial View

MTD 1510 Ground-Level View

Salt Canyon MTD 1510 Catchment Land Use [1]

HUC-12			Outfall		
Residential	**Commercial**	**Open**	**Residential**	**Commercial**	**Open**
24%	68%	8%	57%	41%	2%

1. Though the proportion of commercial land use is greater within the HUC-12 drainage as compared to the outfall drainage area, this is the most significant and contiguous land use directly upstream of the monitoring location. For additional information related to the process and criteria used to select outfalls for monitoring, refer to Attachment D.

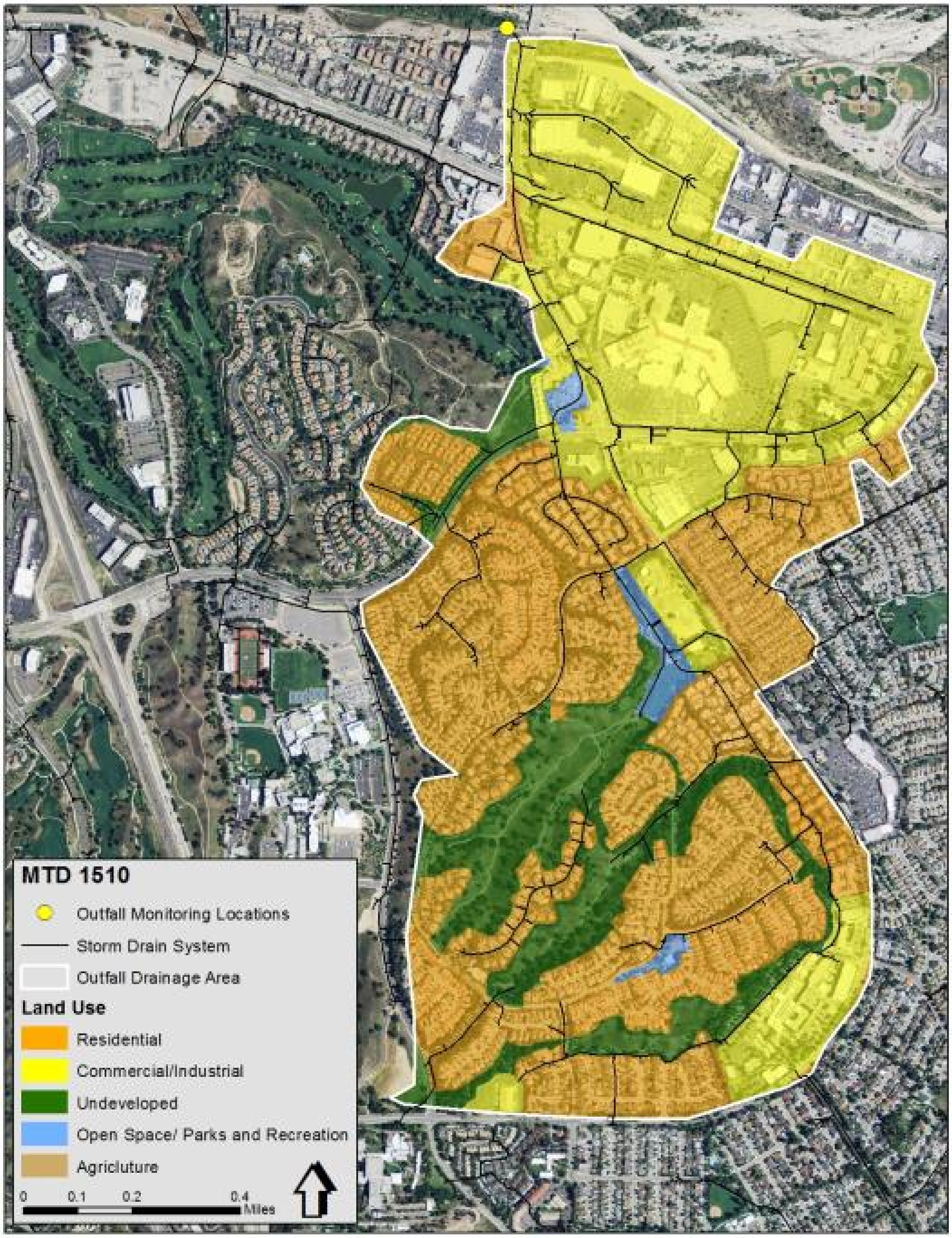


Figure B-6. Catchment Land Use for Salt Canyon

2.7 Lake Elizabeth (East)

HUC-12	Group Member	Drain Name	Size	Site Type	Latitude	Longitude
Lake Elizabeth	County	Unknown	30 inches	SW Outfall	34.66196	-118.38712

General Description: SW outfall monitoring site discharging to Lake Elizabeth just west of the intersection of Ranch Club Road and Montello Drive. The Lake Elizabeth (East) drain monitoring site only receives drainage from the County.

Lake Elizabeth (East) Aerial View

Lake Elizabeth (East) Ground-Level View

Figure B-7. Outfall Monitoring Location for Lake Elizabeth East

3 OPTIONAL SPECIAL STUDY SITES

The optional special study sites identified in the USCRWMG's EWMP area are summarized in **Table B–3**. **Section 4** of the CIMP details the site selection process which resulted in the selection of the identified sites.

Table B-3. Summary of Optional Special Study Sites

Receiving Water Monitoring Sites

		Coordinates		Monitoring Type		
Site ID	**Water Body**	**Latitude**	**Longitude**	**RWA**	**TMDL**	**Other**
SNTCLR_7_FLG	SCR Reach 7	34.42972	-118.35444		X(1)	
SNTCLR_BC_SWAMP	Bouquet Canyon	34.42782	-118.54022			X(2)
SNTCLR_BC_PARK	Bouquet Canyon	34.43267	-118.52596			X(2)

Storm Water Outfall Monitoring Sites

HUC-12	Jurisdiction	Drain Name	Size	Shape	Material	Latitude	Longitude
Lower Bouquet Canyon (2)	City	PD 1256/ PD 1713	54"	Round	Reinforced Conc. Pipe	34.45648	-118.53596

1. Site may be used to assess potential bacteria contributions from natural areas consistent with optional special studies outlined in the Bacteria TMDL.
2. Site may be monitored to characterize receiving water quality and identify sources of pyrethroids in Bouquet Canyon, a USCRWMG identified water quality priority.

3.1 Optional Santa Clara River Reach 7 TMDL Special Study Site

Waterbody Name	Waterbody Type	Site ID	Historical Site ID	Site Type	Latitude	Longitude
SCR Reach 7	Main Stem	SNTCLR_7_FLG	N/A	TMDL	34.42972	-118.35444

General Description: Special study monitoring site identified as an optional monitoring site for the Bacteria TMDL. This monitoring site is located at the upstream end of Reach 7 near a former United States Geological Survey and current Los Angeles County Department of Public Works gaging station. The only urbanized area upstream of this monitoring site is Acton, which is over ten miles upstream of this site. There is little anthropogenic influence at this site, which would allow the samples from this monitoring site to characterize water quality from primarily natural areas upstream of the urbanized areas discharging to Reach 7. This would be beneficial for understanding the possible contribution of TMDL constituents to the Santa Clara River from natural sources.

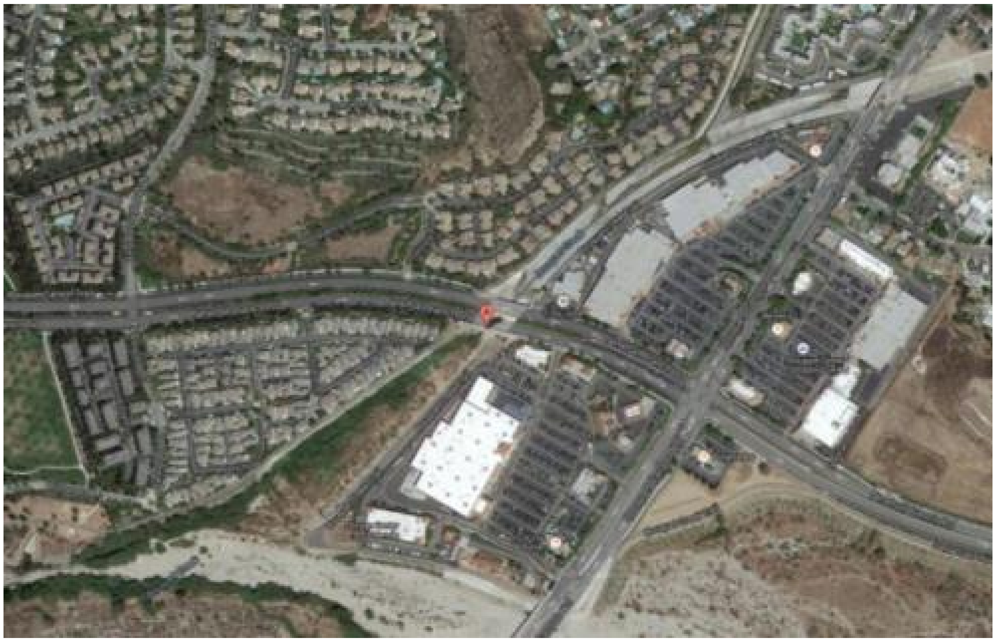
SNTCLR_7_FLG Aerial View

SNTCLR_7_FLG Ground-Level View

3.2 Bouquet Canyon Optional Special Study Site

Waterbody Name	Waterbody Type	Site ID	Historical Site ID	Site Type	Latitude	Longitude
Bouquet Canyon	Tributary	SNTCLR_BC_SWAMP	N/A	Special Study	34.42782	-118.54022

General Description: Special study monitoring site located at a Surface Water Ambient Monitoring Program site at the downstream end of Bouquet Canyon.



SNTCLR_BC_SWAMP Aerial View

SNTCLR_BC_SWAMP Ground-Level View

3.3 Bouquet Canyon Optional Special Study Site

Waterbody Name	Waterbody Type	Site ID	Historical Site ID	Site Type	Latitude	Longitude
Bouquet Canyon	Tributary	SNTCLR_BC_PARK	N/A	Special Study	34.43267	-118.52596

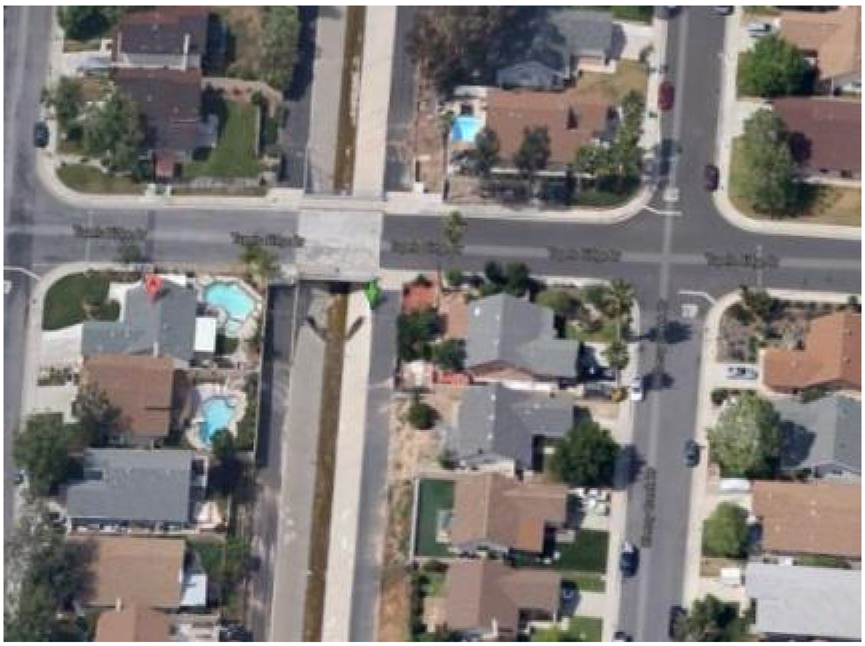
General Description: Special study monitoring site located in the middle of Bouquet Canyon near the Central Park.

SNTCLR_BC_PARK Aerial View

SNTCLR_BC_PARK Ground-Level View

3.4 PD 1256/PD 1713 Optional Special Study Outfall Location

HUC-12	Group Member	Drain Name	Size	Site Type	Latitude	Longitude
Lower Bouquet Canyon	City	PD 1256/PD 1713	54 inches	Special Study-SW Outfall	34.45648	-118.53596
General Description: New SW outfall monitoring site discharging just downstream of Tupelo Ridge Drive to an unnamed tributary to Lower Bouquet Canyon Creek. The PD 1256/PD 1713 drain monitoring site only receives drainage from the City. Primary land use types include: 95 percent residential, 5 percent commercial/industrial, and 0 percent open space.						



PD 1256/PD 1713 Aerial View

PD 1256/PD 1713 Ground-Level View

Attachment C: Table E-2 Constituents of the Monitoring and Reporting Program to be Monitored During First Year and Those That Have Not Been Detected

During the water quality priorities data evaluation, it was determined that a number of constituents from Table E-2 of the Monitoring and Reporting Program portion of the Permit had never been detected in any reach of the USCR EWMP area. This determination was made upon consideration of ten years (2002-2012) of monitoring data within the USCR EWMP area from the Los Angeles Department of Public Works providing long-term data from the SCR mass emission station S29 and Los Angeles County Sanitation Districts long-term receiving water monitoring data. A total of 30,291 data records were compiled and reviewed. Those constituents that have never been detected have been removed from the list of constituents that must be analyzed during the first year. The remaining constituents to be monitored are listed below in **Table C-1**. Those constituents that were never detected are listed in **Table C-2** along with the methods used for their analysis.

Table C-1. Constituents from Table E-2 to be Monitored During the First Year

CONSTITUENTS
CONVENTIONAL POLLUTANTS
Oil and Grease
Total Phenols
Cyanide
pH
Temperature
Dissolved Oxygen
BACTERIA
E coli
Fecal Coliform
GENERAL
Dissolved Phosphorus
Total Phosphorus
Turbidity
Total Suspended Solids
Total Dissolved Solids

CONSTITUENTS
Volatile Suspended Solids
Total Organic Carbon
Total Petroleum Hydrocarbon
Biochemical Oxygen Demand
Chemical Oxygen Demand
Total Ammonia-Nitrogen
Total Kjeldahl Nitrogen
Nitrate-Nitrogen
Nitrite-Nitrogen
Alkalinity
Specific Conductivity
Hardness
MBAS
Chloride
Fluoride
Perchlorate
METALS
Aluminum
Antimony
Arsenic
Beryllium
Cadmium
Chromium (total)
Chromium (Hexavalent)
Copper
Iron
Lead
Mercury
Nickel
Selenium
Silver
Thallium
Zinc
SEMIVOLATILE ORGANIC COMPOUNDS
Acids

CONSTITUENTS
2-Nitrophenol
Phenol
2,4,6-Trichlorophenol
Base/Neutral
Acenaphthene
Acenaphthylene
Anthracene
Benzo(k)Fluoranthene
Bis(2-Ethylhexl) phthalate
Butyl benzyl phthalate
Chrysene
Dibenzo(a,h)Anthracene
1,4-Dichlorobenzene
Diethyl phthalate
di-n-Butyl phthalate
Fluoranthene
Indeno(1,2,3-cd)Pyrene
Isophorone
Nitrobenzene
Phenanthrene
Pyrene
ORGANOPHOSPHATE PESTICIDES
Chlorpyrifos
Diazinon
HERBICIDES
Glyphosate

Table C-2. Constituents from Table E-2 That Were Not Detected in the Ten Year Dataset

CONSTITUENTS	ANALYTICAL METHOD
GENERAL	
Methyl tertiary butyl ether (MTBE)	EPA 624/ 8260B
SEMIVOLATILE ORGANIC COMPOUNDS	
Acids	
2-Chlorophenol	EPA 625
4-Chloro-3-methylphenol	EPA 625

CONSTITUENTS	ANALYTICAL METHOD
2,4-Dichlorophenol	EPA 625
2,4-Dimethylphenol	EPA 625
2,4-Dinitrophenol	EPA 625
4-Nitrophenol	EPA 625
Pentachlorophenol	EPA 625
2,4,6-Trichlorophenol	EPA 625
Base/ Neutral	
Benzidine	EPA 625/ 1625(Modified)
1,2 Benzanthracene	EPA 625/ 525.2
Benzo(a)pyrene	EPA 625/ 525.2
Benzo(g,h,i)perylene	EPA 625/ 525.2
3,4 Benzoflouranthene	EPA 625/ 525.2
Bis(2-Chloroethoxy) methane	EPA 625
Bis(2-Chloroisopropyl) ether	EPA 625
Bis(2-Chloroethyl) ether	EPA 625
4-Bromophenyl phenyl ether	EPA 625
2-Chloroethyl vinyl ether	EPA 624/625/ 524.2
2-Chloronaphthalene	EPA 625
4-Chlorophenyl phenyl ether	EPA 625
1,3-Dichlorobenzene	EPA 625/ 8260B
1,2-Dichlorobenzene	EPA 625/ 8260B
3,3-Dichlorobenzidine	EPA 625/ 1625(Modified)
Dimethyl phthalate	EPA 625/ 525.2
2,4-Dinitrotoluene	EPA 625/ 525.2
2,6-Dinitrotoluene	EPA 625/ 525.2
4,6 Dinitro-2-methylphenol	EPA 625
1,2-Diphenylhydrazine	EPA 625/ 8270C
di-n-Octyl phthalate	EPA 625/ 525.2
Fluorene	EPA 625/ 525.2
Hexachlorobenzene	EPA 625/ 1699(Modified)
Hexachlorobutadiene	EPA 625/ 524.2
Hexachloro-cyclopentadiene	EPA 625/ 525.2
Hexachloroethane	EPA 625
Naphthalene	EPA 625/ 525.2
N-Nitroso-dimethyl amine	EPA 625/ 1625(Modified)
N-Nitroso-diphenyl amine	EPA 625
N-Nitroso-di-n-propyl amine	EPA 625/ 1625(Modified)
1,2,4-Trichlorobenzene	EPA 625/ 524.2
CHLORINATED PESTICIDES	
Aldrin	EPA 608/ 625/ 1699(Modified)

CONSTITUENTS	ANALYTICAL METHOD
alpha-BHC	EPA 608/ 625/ 1699(Modified)
beta-BHC	EPA 608/ 625
delta-BHC	EPA 608/ 625
gamma-BHC (lindane)	EPA 608/ 625/ 1699(Modified)
alpha-chlordane	EPA 608/ 625
gamma-chlordane	EPA 608/ 625
4,4'-DDD	EPA 608/ 625
4,4'-DDE	EPA 608/ 625
4,4'-DDT	EPA 608/ 625
Dieldrin	EPA 608/ 625/ 1699(Modified)
alpha-Endosulfan	EPA 608/ 625/ 1699(Modified)
beta-Endosulfan	EPA 608/ 625/ 1699(Modified)
Endosulfan sulfate	EPA 608/ 625/ 1699(Modified)
Endrin	EPA 608/ 625/ 1699(Modified)
Endrin aldehyde	EPA 608/ 625/ 1699(Modified)
Heptachlor	EPA 608/ 625/ 1699(Modified)
Heptachlor Epoxide	EPA 608/ 625/ 1699(Modified)
Toxaphene	EPA 608/ 625/ 1699(Modified)
POLYCHLORINATED BIPHENYLS	
Aroclor-1016	EPA 505/608
Aroclor-1221	EPA 505/608
Aroclor-1232	EPA 505/608
Aroclor-1242	EPA 505/608
Aroclor-1248	EPA 505/608
Aroclor-1254	EPA 505/608
Aroclor-1260	EPA 505/608
ORGANOPHOSPHATE PESTICIDES	
Atrazine	EPA 507
Cyanazine	EPA 507
Malathion	EPA 507
Prometryn	EPA 507
Simazine	EPA 507
HERBICIDES	
2,4-D	EPA 515.3/ 8151A
2,4,5-TP-SILVEX	EPA 515.3/ 8151A

Attachment D: Stormwater Outfall Selection

1 Stormwater Outfall Site Selection

The primary criterion cited in the MRP for selection of monitoring sites for the stormwater outfall monitoring program is that the sites are representative of the range of land uses in the area. However, land use representativeness was not the only criterion used for site selection. The site selection process began with over 300 outfalls considered, which were narrowed down to 21 potential outfalls that were then assessed with field visits to determine their viability as monitoring locations. Potential sites were also evaluated to consider the jurisdiction draining to the site, the ultimate receiving water for the site, and the characteristics of the drainage area (e.g. primarily newer development built to SUSMP standards or primarily pre-SUSMP development). The selected sites are those that are as closely representative of the HUC-12 land use as possible, reflect the other criteria assessed, and are suitable for safe monitoring. Some sites also reflect the City's smart growth strategy to cluster commercial land uses and include more multi-use development and maintaining open space, particularly around the City perimeter. An additional criterion for site selection is the ability to accurately measure flows to characterize pollutant loads. Flow measurement is easily addressed by physical assessment of the site conditions and consideration of access to the site. The primary criterion in the MRP implies an assessment of variation of land uses within the WMA, potential variation in water quality issues for different HUC-12 drainages, and geographic variation in factors influencing runoff quality.

The default approach in the MRP to achieving adequate representation is to select one major outfall in each hydrological unit (HUC–12) within each individual Permittee's jurisdiction. Consequently, the minimum number of outfalls required for monitoring under the default approach is equal to the total number of unique combinations of HUC–12s and jurisdictions. The default approach is geared toward ensuring adequate accountability and representation if the Permittees monitor as individual entities, but results in monitoring more outfall discharges than needed for efforts coordinated among the USCRWMG. For the Santa Clara River WMA, there would be 13 stormwater outfalls using the default approach.

The default approach would also result in several areas of relatively small and isolated HUC–12-Jurisdictional overlap for the EWMP Group. In some cases, these areas are predominately open space or undeveloped area. These areas are essentially an artifact of the default approach and would not provide significant additional characterization of runoff.

As an alternative to the MRP's default monitoring approach, the EWMP Group is proposing to monitor six outfalls with approximately one major outfall for each HUC-12 in the WMA. The monitoring sites would consist of six outfalls with drains collecting runoff from throughout the WMA. The resulting data would be considered representative of all Group Members' discharge in the HUC–12s, would provide representative results needed to meet all monitoring objectives, and would also provide the basis for stormwater management decisions for all Group Members. The rationale supporting the EWMP Group's alternative approach follows.

2 Representativeness of Selected Outfalls

The drainages within the EWMP Group's WMA are comprised primarily of residential, commercial, and industrial land uses, with minimal percentages of agriculture. The six proposed outfalls were selected specifically to characterize runoff from drainages that are representative of the mix of these primary land uses in the WMA, and to minimize contributions from other land uses. Land use summaries for the USCRWMG are listed in **Table D-1.**

- Residential land use represents 45–95% of the monitored drainages.
- Commercial and Industrial land use represent 5–41% of the monitored drainages.
- Non-urban influences on runoff are minimized: Agriculture represents <1%.

The monitored outfalls and drainages are geographically distributed in the WMA, and runoff from all six HUC–12s with significant urban drainage is characterized as well as runoff from each of the two jurisdictions (City of Santa Clarita and the County of Los Angeles). While six of the seven HUC–12s with significant developed areas have stormwater outfall monitoring sites, the seventh HUC–12 (Lower Bouquet Canyon) has a comparable land use distribution to the adjacent San Francisquito HUC–12 (**Table D-2**). The monitored drainages (not including special study sites) also represent a range of drainage sizes (0.03 – 1.23 square miles) and would directly characterize approximately 65% of the total EWMP drainage area.

Table D-1. Land Use Summary, areas in square miles and percent of drainage

Outfall	HUC -12	Jurisdiction	Includes only open space [1]				Includes undeveloped and open space [2]			
			Total (sq. mi.)	Res. %	Comm. /Ind. %	Open %	Total (sq. mi.)	Res. %	Comm. /Ind. %	Open %
MTD 1510	Salt Canyon/ Santa Clara River	City	1.23	57%	41%	2%	1.47	48%	34%	18%
MTD 1643	San Francisquito Canyon	City	0.18	82%	7%	12%	0.23	64%	5%	31%
PD 0494	Sand Canyon/ Santa Clara River	City	0.28	88%	12%	0%	0.31	79%	10%	11%
PD 0717	South Fork Santa Clara River	City	0.95	83%	9%	8%	1.91	41%	5%	54%
PD 2443	Lower Castaic Creek	County	0.10	45%	37%	18%	0.21	22%	18%	60%
PD 2516	Mint Canyon	County	0.03	68%	32%	0%	0.16	12%	6%	83%

1. Calculated using open space defined as local parks, regional parks and golf courses.
2. Calculated using undeveloped and open space defined as local parks, regional parks, golf courses, under construction, vacant lands, and natural open space, .

Table D–2. Land Use Comparison of Comparable HUC–12s

San Francisquito HUC–12[1]		
Residential	Commercial	Open
82%	13%	5%
Lower Bouquet Canyon HUC–12		
Residential	Commercial	Open
87%	9%	4%

1. Stormwater outfall monitoring site MTD 1643 is located within this HUC–12.

3 STORMWATER MONITORING DATA VARIABILITY

The inter-event variability (e.g., for different storm events) in stormwater discharge quality is much greater than between individual outfall drainages or major land uses. Based on stormwater monitoring results from other programs, discharge quality from drainages with similar mixed land uses is not substantially different, and it will be impossible to distinguish statistically between drainages with a reasonable amount of monitoring because of the high variability in discharge quality for each site. The statistical power analysis based on the range of typical stormwater discharge quality distributions and the number of samples collected for the permit term, 15 samples per site, is enumerated in **Table D-3**. For example, the analysis results in an average difference between sites would need to be greater than 62% to be detected with 95% confidence and 80% power for a pollutant with a fairly "typical" coefficient of variance (COV) of 0.66. COVs for stormwater discharge quality are generally greater than 0.2 and commonly exceed 1.0. Programmatically meaningful differences (i.e., differences between sites as small as 20%) would not be expected to be detected for most constituents over the time frame of the permit.

Table D-3. Detectible Significant Percent Differences between Sites

Sample Size = 15, alpha = 0.05		
COV	**power=0.8**	**power 0.9**
0.20	21%	24%
0.31	32%	36%
0.42	42%	48%
0.53	52%	59%
0.66	62%	70%
0.80	71%	81%
0.95	80%	91%
1.12	89%	100%
1.31	97%	109%

Given the high variability typical of stormwater pollutant levels, and with only a few storm events that can be collected per year, it will not be possible to make *meaningful* distinctions between drainages, either within land use types, across land use types, or between jurisdictions. Management implementation by the Permittees is also expected to be relatively consistent throughout the WMA, so additional focus on geographic differences is not necessary. This means that only a handful of sites are needed to adequately characterize land use discharge quality within the WMA. Consequently, sampling more than a few representative sites is unlikely to significantly improve characterization of runoff quality, or to better inform the USCRWMG's management decisions.

Realistically achievable changes in stormwater runoff quality or loads (e.g., 20–50% reductions) are statistically demonstrable only over relatively long periods of time (≥10 years). This is also due to the high variability between events and the relatively few number of events that can be sampled each season, and additional monitoring sites will do little to improve the statistical power of such trend analysis within the permit time frame compared to longer periods of evaluation. This also supports the need to assess management effectiveness and compliance based primarily on successful implementation actions rather than explicit demonstration of improvements in runoff quality.

4 RECOMMENDATION FOR STORMWATER OUTFALL SITE SELECTION

Based on the evaluations above, the EWMP Group's proposed CIMP approach is to monitor six outfalls representing approximately one outfall for each HUC–12 in the WMA, the selected outfalls will provide the representative data needed to meet the specific permit objectives for stormwater outfall monitoring and support management decisions of the EWMP Group. Additional monitoring sites within these seven HUC–12s will not provide significant improvements in representation or characterization of discharge quality, or additional information for discharge quality management.

Attachment E: Reporting and Data Management

Reporting

The following sections detail monitoring and reporting requirements outlined in the MRP.

DOCUMENTS AND RECORDS

Group Members shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to completed the Report of Waste Discharge (ROWD) and application of this Order, for a period of at least three years from the date of the sample, measurement, report, or application.

Event Summary Reports

Reports of monitoring activities shall include at a minimum the following information:

- The date, time of sampling or measurements, exact place, weather conditions, and rain fall amount;
- The individual(s) who performed the sampling or measurements;
- The date(s) analyses were performed;
- The individual(s) who performed the analyses;
- The analytical techniques or methods used;
- The results of such analyses; and
- The data sheets showing toxicity test results.

Semi-Annual Analytical Data Reports

Results from each of the receiving water or outfall based monitoring station conducted in accordance with the Standard Operating Procedure shall be sent electronically to the Regional Water Board's Stormwater site at MS4stormwaterRB4@waterboards.ca.gov. The monitoring results will be submitted on a semi-annual basis and will highlight exceedances applicable to WQBELs, receiving water limitations, action levels, or aquatic toxicity thresholds. Corresponding sample dates and monitoring locations will be included. Data will be transmitted in the most recent Southern California Municipal Stormwater Monitoring Coalition's Standardized Data Transfer Formats.

MONITORING REPORTS

Report Objectives

The annual reporting process is intended to provide the Regional Water Board with summary information to allow for the assessment of the Permittees:

- Participation in one or more Watershed Management Programs.
- Impact of each Permittee(s) stormwater and non-stormwater discharges on the receiving water.
- Each permittee's compliance with receiving water limitations, numeric water quality based effluent limitations, and non-stormwater action levels.
- The effectiveness of each Permittee(s) control measures in reducing discharges of pollutants from the MS4 to receiving waters.
- Whether the quality of MS4 discharges and the health of receiving waters is improving, staying the same, or declining as a result of watershed management program efforts, and/or TMDL implementation measures, or other Minimum Control Measures.
- Whether changes in water quality can be attributed to pollutant controls imposed on new development, re-development, or retrofit projects.

The annual report process also seeks to provide a forum for Permittee(s) to discuss the effectiveness of its past and ongoing control measure efforts and to convey its plans for future control measures. Detailed data and information will also be provided in a clear and transparent fashion to allow the Regional Board and the general public to review and verify conclusions presented by the Permittee.

Annual Reports

Annual reports shall be organized to include the following information.

Watershed Summary Information

Section XVII B of the MRP allows for Permittee(s) participation in a Watershed Management Program to provide the following Watershed Summary Information through the development of a Watershed Management Program.

Watershed Management Area

When a Permittee has collaboratively developed a Watershed Management Program (WMP), reference to the WMP and any revisions to the WMP may suffice for baseline information regarding the WMA. If not, the annual report must contain information detailing the following:

1. The effective TMDLs, applicable WQBELs and receiving water limitations, and implementation and reporting requirements, and compliance dates

2. CWA section 303(d) listings of impaired waters not addressed by TMDLs
3. Results of regional bioassessment monitoring
4. A description of known hydromodificaitons to receiving waters and a description, including locations, of natural drainage systems.
5. Description of groundwater recharge areas including number and acres
6. Maps and/or aerial photographs identifying the location of ESAs, ASBS, natural drainage systems, and groundwater recharge areas

Subwatershed (HUC-12) Descriptions

Information shall be included for each Subwatershed (HUC-12) within the Permittee(s) jurisdiction. Where relevant information is already present in a WMP, baseline information regarding the subwatershed descriptions may be satisfied by reference to the WMP. The following descriptions of subwatersheds must be present:

1. Description including HUC-12 number, name and a list of all tributaries named in the Basin Plan.
2. Land Use map of the HUC-12 watershed.
3. 85^{th} percentile, 24-hour rainfall isohyetal map for the subwatershed.
4. One-year, one-hour storm intensity isohyetal map for the subwatershed.
5. MS4 map for the subwatershed, including major MS4 outfalls and all low-flow diversions.

Description of Permittee(s) Drainage Area within the Subwatershed

Information shall be included for each drainage area within the Permittee(s) jurisdiction. Where relevant information is already present in a WMP, baseline information regarding the subwatershed descriptions may be satisfied by reference to the WMP. The following descriptions of drainage area must be present:

1. A subwatershed map depicting the Permittee(s) jurisdictional area and the MS4, including major outfalls (with identification numbers), and low flow diversions located within the Permittee(s) jurisdictional area.
2. Provide the estimated baseline percent of effective impervious area (EIA) within the Permittee(s) jurisdictional area.

Annual Assessment and Reporting

The following sections shall be included in each Permittee or group of Watershed Permittees' Annual Report. The information will be provided for each watershed within the Permittee's jurisdiction.

Annual Reports submitted on behalf of a group of watershed Permittees shall clearly identify all data collected and strategies, control measures, and assessments implemented by each Permitee within its jurisdiction as well as those implemented by multiple Permittees on a watershed scale.

Stormwater Control Measures

The following information shall be complied for inclusion in the Annual Report by each Permittee.

1. Estimated cumulative change in percent EIA since the effective date of the Order, and if possible, the estimated change in the stormwater runoff volume during the 85^{th} percentile storm event.
2. Summary of New Development/Re-Development Projects constructed within the Permittee(s) jurisdictional area during the reporting year.
3. Summary of Retrofit Projects that reduced or disconnected impervious area from MS4 during the reporting year.
4. Summary of other projects designed to intercept stormwater runoff prior to discharge to the MS4 during the reporting year.
5. Estimate the total runoff volume retained on site by the implementation of such projects during the reporting year.
6. Summary of actions taken in compliance with TMDL implementation plans or approved Watershed Management Programs to implement TMDL provisions.
7. Summary of riparian buffer/wetland restoration projects completed during the reporting year. For riparian buffers include width, length and vegetation type; for wetland include acres restored, enhanced or created.
8. Summary of other Minimum Control Measures implemented during the reporting year, as the Permittee deems relevant.
9. Status of all multi-year efforts that were not completed in the current year and will therefore continue into the subsequent year(s). Additionally, if any of the requested information cannot be obtained, the Permittee(s) shall provide a discussion of the factor(s) limiting its acquisition and steps that will be taken to improve future data collection efforts.

Effectiveness Assessment of Stormwater Control Measures

The following information will be included to detail Stormwater Control Measures during the reporting year:

1. Rainfall summary for the reporting year. Summarize the number of storm events, highest volume event (inches/24 hours), highest number of consecutive days with measurable rainfall, total rainfall during the reporting year compared to average annual rainfall for the subwatershed.

2. Provide a summary table describing rainfall during stormwater outfall and wet-weather receiving water monitoring events. The summary description shall include the date, time that the storm commenced and the storm duration in hours, the highest 15-minute recorded storm intensity (converted to inches/hour), the total storm volume (inches), and the time between the storm event sampled and the end of the previous storm event.
3. Where control measures were designed to reduce impervious cover or stormwater peak flow and flow duration, provide hydrographs or flow data of pre- and post-control activity for the 85th percentile, 24-hour rain event, if available.
4. For natural drainage systems, develop a reference watershed flow duration curve and compare it to a flow duration curve for the subwatershed under current conditions.
5. Provide an assessment as to whether the quality of stormwater discharges as measured at designed outfalls is improving, staying the same or declining. The permittee may compare water quality data from the reporting year to previous years with similar rainfall patterns, conduct trends analysis, or use other means to develop and support its conclusions.
6. Provide an assessment as to whether wet-weather receiving water quality within the jurisdiction of the Permittee is improving, staying the same or declining, when normalized for variations in rainfall patterns. The permittee may compare water quality data from the reporting year to previous years with similar rainfall patterns, conduct trends analysis, draw from regional bioassessment studies, or use other means to develop and support its conclusions.
7. Status of all multi-year efforts, including TMDL implementation, that were not completed in the current year and will continue into the subsequent year(s). Additionally, if any of the requested information cannot be obtained, the Permittee shall provide a discussion of the factors(s) limiting its acquisition and steps that will be taken to improve future data collection efforts.

Non-stormwater Water Control Measures

The following information will be included to detail non-stormwater control measures present in the Permittee’s jurisdiction:

1. Estimate the number of major outfalls within the Permittee’s jurisdiction in the subwatershed.
2. Provide the number of outfalls what were screened for significant non-stormwater discharges during the reporting year.
3. Provide the cumulative number of outfalls that have been screened for significant non-stormwater discharges since the date the Order was adopted through the reporting year.
4. Provide the number of outfalls with confirmed significant non-stormwater discharge.
5. Provide the number of outfalls where significant non-stormwater discharge was attributed to other NPDES permitted discharges; other authorized non-stormwater discharges; or conditionally exempt discharges.

6. Provide the number of outfalls where significant non-stormwater discharges were abated as a result of the Permittee's actions.
7. Provide the number of outfalls where non-stormwater discharges was monitored.
8. Provide the status of all multi-year efforts, including TMDL implementation, that were not completed in the current year and will continue into the subsequent year(s). Additionally, if any of the requested information cannot be obtained, the Permittee shall provide a discussion of the factor(s) limiting its acquisition and steps that will be taken to improve future data collection efforts.

Effectiveness Assessment of Non-Stormwater Control Measures

The following information will be included to assess non-stormwater control measures effectiveness:

1. Provide an assessment as to whether receiving water quality within the jurisdiction of the Permittee is impaired, improving, staying the same or declining during the dry-weather conditions. Each Permittee may compare water quality data from the reporting year to previous years with similar dry-weather flows, conduct trends analysis, draw from regional bioassessment studies, or use other means to develop and support its conclusions.
2. Provide an assessment of the effectiveness of the Permittee(s) control measures in effectively prohibiting non-stormwater discharges through the MS4 to the receiving water.
3. Provide the status of all multi-year efforts that were not completed in the current year and will continue into the subsequent year(s).

Integrated Monitoring Compliance Report

The following information will be included to assess the Permittee(s) compliance with applicable TMDLs, WQBELs, receiving water limitations, and action levels:

1. Provide an Integrated Monitoring Report that summarizes all identified exceedances of the following against applicable receiving water limitations, water quality-based effluent limitations, non-stormwater action levels, and aquatic toxicity thresholds:
    a. Outfall-based stormwater monitoring data
    b. Wet weather receiving water monitoring data
    c. Dry weather receiving water data
    d. Non-stormwater outfall monitoring data

   All sample results that exceeded one more applicable thresholds shall be readily identified.

2. If aquatic toxicity was confirmed and a TIE was conducted, identify the toxic chemicals as determined by the TIE. Include all relevant data to allow the Regional Water Board to review the adequacy and findings of the TIE. This shall include, but not limited to:
    a. The sample(s) date

b. Sample(s) start and end time,
c. Sample type(s)
d. Sample location(s) as depicted on a map
e. The parameters, analytical results, and applicable limitation.

3. Provide a description of efforts that were taken to mitigate and/or eliminate all non-stromwater discharges that exceeded one or more applicable water quality based effluent limitations, or caused or contributed to Aquatic Toxicity.
4. Provide a description of efforts that were taken to address stormwater discharges that exceeded one or more applicable water quality based effluent limitations, or caused or contributed to Aquatic Toxicity.
5. Where Receiving Water Limitations were exceeded, provide a description of efforts that were taken to determine whether discharges from the MS4 caused or contributed to the exceedances and all efforts that were taken to control the discharge of pollutants from the MS4 to those receiving waters in response to the exceedances.

Adaptive Management Strategies

The following information will be included to outline Adaptive Management Strategies:

1. Identify the most effective control measures and describe why the measures were effective and how other measures will be optimized based on past experiences.
2. Identify the least effective control measures and describe why the measures were deemed ineffective and how the controls measures will be modified or terminated.
3. Identify significant changes to control measures during the prior year and the rationale for the changes.
4. Describe all significant changes to control measures anticipated to be made next year and rationale for the changes. Those changes requiring approval of the Regional Water Board or its Executive Officer shall be clearly identified at the beginning of the Annual Report.
5. Include a detailed description of control measures to be applied to new Development or Re-development projects disturbing more than 50 acres.
6. Provide the status of all multi-year efforts that were not completed in the current year and will continue into the subsequent year(s).

Supporting Data and Information

All monitoring data and associated meta data used to prepare the Annual Report shall be summarized in an Excel spreadsheet and sorted by watershed, subwatershed and monitoring station/outfall identifier linked to the subwatershed map. The data summary must include the date, sample type (flow-weighted composite, grab, field measurement), sample start and stop times, parameter, analytical method, value, and units. The date field must be linked to a database summarizing the weather data for the sampling date including 24-hour rainfall, rainfall intensity, and days since the previous rain event.

Attachment F: Monitoring Procedures

Attachment F details the monitoring procedures that will be utilized to collect and analyze samples to meet the goals and objectives of the CIMP and in turn the Permit. The details contained herein serve as a guide for ensuring that consistent protocols and procedures are in place for successful sample collection and analysis. This attachment is divided into the following six sections:

1. Analytical Procedures
2. Sample Collection and Handling
3. Quality Assurance/Quality Control
4. Instrument/Equipment Calibration and Frequency
5. Data Management, Validation, and Usability
6. Monitoring Procedures References

1 Analytical Procedures

The following subsections detail the analytical procedures for data generated in the field and in the laboratory.

1.1 Field Parameters

Portable field meters will measure within specifications outlined in **Table F-1**.

Table F-1. Analytical Methods and Project Reporting Limits for Field Measurements

Parameter/Constituent	Method	Range	Project RL
Current velocity	Electromagnetic	-0.5 to +20 ft/s	0.05 ft/s
pH	Electrometric	0 – 14 pH units	NA
Temperature	High stability thermistor	-5 – 50 ^{o}C	NA
Dissolved oxygen	Membrane or Optical	0 – 50 mg/L	0.5 mg/L
Conductivity	Graphite electrodes	0 – 10 mmhos/cm	2.5 umhos/cm

RL – Reporting Limit NA – Not applicable

1.2 Methods and Detection and Reporting Limits

Method detection limits (MDL) and reporting limits (RLs) must be distinguished for proper understanding and data use. The MDL is the minimum analyte concentration that can be measured and reported with a 99% confidence that the concentration is greater than zero. The RL represents the concentration of an analyte that can be routinely measured in the sampled matrix within stated limits and with confidence in both identification and quantitation.

For this program, RLs must be verifiable by having the lowest non-zero calibration standard or calibration check sample concentration at or less than the RL. RLs have been established in this CIMP based on the verifiable levels and general measurement capabilities demonstrated for each method. These RLs should be considered as maximum allowable reporting limits to be used for laboratory data reporting. Note that samples diluted for analysis may have sample-specific RLs that exceed these RLs. This will be unavoidable on occasion. However, if samples are consistently diluted to overcome matrix interferences, the analytical laboratory will be required to notify the Project Manager how the sample preparation or test procedure in question will be modified to reduce matrix interferences so that project RLs can be met consistently.

Analytical methods, MDLs, and RLs required for samples analyzed in the laboratory are summarized in **Table F-2**. For organic constituents, environmentally relevant detection limits will be used to the extent practicable. The MDLs and/or RLs listed in **Table F-2** for several OC pesticides (aldrin, alpha-BHC, chlordane, the DDTs, dieldrin and toxaphene) are higher than applicable water quality objectives. However, the MDLs and/or RLs listed in **Table F-2** are Consistent with the requirements of the available minimum levels provided in the Permit. Alternative methods with MDLs and/or RLs that are at or below those listed in **Table F-2** are considered equivalent and can be used in place of the methods presented.

Prior to the analysis of any environmental samples, the laboratory must have demonstrated the ability to meet the minimum performance requirements for each analytical method presented in **Table F-2**. The initial demonstration of capability includes the ability to meet the project-specified Method Detection Limits and Reporting Limits, the ability to generate acceptable precision and accuracy, and other analytical and quality control parameters documented in this CIMP. Data quality objectives for precision and accuracy are summarized in **Table F-3**.

Table F-2. Analytical Methods and Project Method Detection and Reporting Limits for Laboratory Analysis

Parameter/Constituent	Method[1]	Units	Project MDL	Project RL
Toxicity				
Ceriodaphnia dubia	EPA-821-R-02-013 (1002.0)	NA	NA	NA
Bacteria[2]				
Fecal coliform (marine and fresh waters)	SM 9221E	MPN/100mL	20	20
Escherichia coli (fresh)	SM 9221/ Colilert-QT	MPN/100mL	1	1
Conventionals				
Oil and Grease	EPA 1664A	mg/L	1.44	5
Total Phenols	EPA 420.1	mg/L	0.03	0.1
Cyanide	SM 4500-CNE/ EPA 335.4	mg/L	0.005	0.005
Total Hardness	SM 2340C	mg/L	2	2
Turbidity	EPA 2130B	NTU	0.1	0.1
Total Organic Carbon	SM 5310B	mg/L	0.5	1
Total Petroleum Hydrocarbon	EPA 418.1	mg/L	1.5	5
Chemical Oxygen Demand	SM 5220D	mg/L	10	20
Biochemical Oxygen Demand	SM 5210B	mg/L	1	2
Total Alkalinity	SM 2320B	mg/L	2	2
Specific Conductance	EPA 2510B	µmho/cm	1	1
MBAS	SM 5540C	mg/L	0.1	0.5
Fluoride	EPA 300.0	mg/L	0.1	0.1
Perchlorate	EPA 314.0	µg/L	4	4
Ammonia (as N)	SM 4500-NH3 C	mg/L	0.1	0.1
Nitrate + Nitrite (as N)	SM 4500-NO3	mg/L	0.1	0.2
Nitrate (as N)	EPA 300.0	mg/L	0.1	0.1
Nitrite (as N)	EPA 300.0	mg/L	0.1	0.1
Total Kjehdahl Nitrogen (TKN)	SM 4500-NH3 C	mg/L	0.1	0.1
Dissolved Phosphorus (as P)	SM 4500-P E	mg/L	0.05	0.05
Total Phosphorus (as P)	SM 4500-P E	mg/L	0.05	0.05
Orthophosphate (as P)	EPA 300.0	mg/L	0.1	0.2
Chloride	EPA 300.0	mg/L	1	1
Solids				
Total Dissolved Solids (TDS)	SM 2540C	mg/L	2	10
Total Suspended Solids (TSS)	SM 2540D	mg/L	1	2
Volatile Suspended Solids	SM 2540E	mg/L	1	1
Metals in Freshwater (dissolved and total)				

Parameter/Constituent	Method[1]	Units	Project MDL	Project RL
Aluminum	EPA 200.8	µg/L	50	100
Antimony	EPA 200.8	µg/L	0.5	0.5
Arsenic	EPA 200.8	µg/L	0.2	1
Beryllium	EPA 200.8	µg/L	0.1	0.5
Cadmium	EPA 200.8	µg/L	0.1	0.25
Chromium (total)	EPA 200.8	µg/L	0.5	0.5
Chromium (Hexavalent)	EPA 200.8	µg/L	0.25	5
Iron	EPA 200.8	µg/L	50	100
Lead	EPA 200.8	µg/L	0.2	0.5
Silver	EPA 200.8	µg/L	0.1	0.25
Thallium	EPA 200.8	µg/L	0.1	1
Copper	EPA 200.8	µg/L	0.5	0.5
Nickel	EPA 200.8	µg/L	0.5	1
Selenium	EPA 200.8	µg/L	0.5	1
Zinc	EPA 200.8	µg/L	1	1
Mercury	EPA 1631	µg/L	0.025	0.05
Organophosphorus Pesticides				
Chlorpyrifos	EPA 507	µg/L	0.02	0.05
Diazinon	EPA 507	µg/L	0.003	0.01
Semivolatile Organic Compounds				
2-Nitrophenol	EPA 625	µg/L	1	10
2,4,6-Trichlorophenol	EPA 625	µg/L	0.33	1
Acenaphthene	EPA 625	µg/L	0.33	1
Acenaphthylene	EPA 625	µg/L	0.67	2
Anthracene	EPA 625	µg/L	0.67	2
Benzo(k)fluoranthene	EPA 625	µg/L	0.67	2
Butyl benzyl phthalate	EPA 625	µg/L	3.33	10
bis(2-Ethylhexyl) phthalate	EPA 625	µg/L	1.67	5
Chrysene	EPA 625	µg/L	1.67	5
Dibenzo(a,h)anthracene	EPA 625	µg/L	0.033	0.1
Diethyl phthalate	EPA 625	µg/L	1	2
Di-n-butylphthalate	EPA 625	µg/L	3.33	10
Fluoranthene	EPA 625	µg/L	0.017	0.05
Indeno(1,2,3-cd)pyrene	EPA 625	µg/L	0.017	0.05
Isophorone	EPA 625	µg/L	0.33	1
Nitrobenzene	EPA 625	µg/L	0.33	1
Phenanthrene	EPA 625	µg/L	0.017	0.05
Phenol	EPA 625	µg/L	0.33	1

Parameter/Constituent	Method[1]	Units	Project MDL	Project RL
Pyrene	EPA 625	µg/L	0.017	0.05
Volatile Organic Compounds				
1,4-Dichlorobenzene	EPA 624	µg/L	0.5	1
Herbicides				
Glyphosate	EPA 547	µg/L	5	5
Pyrethroid Pesticides[3]				
Bifenthrin	EPA 625	µg/L	TBD	TBD
Cyfluthrin	EPA 625	µg/L	TBD	TBD
Cypermethrin	EPA 625	µg/L	TBD	TBD
Deltamethrin	EPA 625	µg/L	TBD	TBD
Esfenvalerate	EPA 625	µg/L	TBD	TBD
Lambda-cyhalothrin	EPA 625	µg/L	TBD	TBD
Permethrin	EPA 625	µg/L	TBD	TBD

MDL – Method Detection Limit   RL – Reporting Limit   NA – Not applicable

1. Methods provided in this table are recommendations. They are subject to change depending upon the analytical laboratory selected for the project, as long as project MDLs and RLs are achieved.
2. MLs for bacteria constituents listed in permit Table E-2 are equivalent to the water quality objectives. Project MDLs and RLs for bacteria constituents listed in this table are typical for the methods listed.
3. Pyrethroid pesticides are part of an optional special study, they are not included in the Permit along with minimum levels or other analytical criteria. As the analytical laboratory is yet to be determined, the pyrethroid pesticides included in the suite and analytical methods may vary. Additionally, for this reason, project MDLs and RLs are not listed.

Table F-3. Data Quality Objectives

Parameter	Accuracy	Precision	Recovery	Completeness
Field Measurements				
Water Velocity (for Flow calc.)	2%	NA	NA	90%
pH	± 0.2 pH units	± 0.5 pH units	NA	90%
Temperature	± 0.5 °C	± 5%	NA	90%
Dissolved Oxygen	± 0.5 mg/L	± 10%	NA	90%
Conductivity	5%	5%	NA	90%
Laboratory Analyses – Water				
Aquatic Toxicity	(1)	(2)	NA	90%
Conventionals(3)	80 – 120%	0 – 25%	80 – 120%	90%
Nutrients(3)	80 – 120%	0 – 25%	90 – 110%	90%
Metals(3)	75 – 125%	0 – 25%	75 – 125%	90%
Semi-Volatile Organics(3)	50 – 150%	0 – 25%	50 – 150%	90%
Volatile Organics(3)	50 – 150%	0 – 25%	50 – 150%	90%
Herbicides(3)	50 – 150%	0 – 25%	50 – 150%	90%
OP Pesticides(3)	50 – 150%	0 – 25%	50 – 150%	90%

1. Must meet all method performance criteria relative to the reference toxicant test.
2. Must meet all method performance criteria relative to sample replicates.
3. Please see Table F-2 for a list of individual constituents in each suite.

1.2.1 Method Detection Limit Studies

Any laboratory performing analyses under this program must routinely conduct MDL studies to document that the MDLs are less than or equal to the project-specified RLs. If any analytes have MDLs that do not meet the project RLs, the following steps must be taken:

- Perform a new MDL study using concentrations sufficient to prove analyte quantitation at concentrations less than or equal to the project-specified RLs per the procedure for the Determination of the Method Detection Limit presented in Revision 1.1. 40 Code of Federal Regulations (CFR) 136, 1984.

- No samples may be analyzed until the issue has been resolved. MDL study results must be available for review during audits, data review, or as requested. Current MDL study results must be reported for review and inclusion in project files.

An MDL is developed from seven aliquots of a standard containing all analytes of interest spiked at five times the expected MDL. These aliquots are processed and analyzed in the same manner as environmental samples. The results are then used to calculate the MDL. If the calculated MDL is less than 0.33 times the spiked concentration, another MDL study should be performed using lower spiked concentration.

1.2.2 Project Reporting Limits

Laboratories generally establish RLs that are reported with the analytical results-these may be called *reporting limits, detection limits, reporting detection limits,* or several other terms by the reporting laboratory. These laboratory limits must be less than or equal to the project RLs listed in **Table F-2**. Wherever possible, project RLs are lower than the relevant numeric criteria or toxicity thresholds. Laboratories performing analyses for this project must have documentation to support quantitation at the required levels.

1.2.3 Laboratory Standards and Reagents

All stock standards and reagents used for standard solutions and extractions must be tracked through the laboratory. The preparation and use of all working standards must be documented according to procedures outlined in each laboratory's Quality Assurance Manual; standards must be traceable according to U.S. EPA, A2LA or National Institute for Standards and Technology (NIST) criteria. Records must have sufficient detail to allow determination of the identity, concentration, and viability of the standards, including any dilutions performed to obtain the working standard. Date of preparation, analyte or mixture, concentration, name of preparer, lot or cylinder number, and expiration date, if applicable, must be recorded on each working standard.

1.3 Sample Containers, Storage, Preservation, and Holding Times

Sample containers must be pre-cleaned and certified free of contamination according to the USEPA specification for the appropriate methods. Sample container, storage and preservation, and holding time requirements are provided in **Table F-4.** The analytical laboratories will supply sample containers that already contain preservative per **Table F-4**, including ultra-pure hydrochloric and nitric acid, where applicable. After collection, samples will be stored at 4^{o}C until arrival at the contract laboratory.

Table F-4. Sample Container, Volume, Initial Preservation, and Holding Time Requirements

Parameter	Sample Container	Sample Volume(1)	Immediate Processing and Storage	Holding Time
Water				
Aquatic Toxicity				
Initial Screening	Glass or FLPE-lined jerrican	40 L	Store at 4^0C	36 hours(2)
Follow-Up Testing				
Phase I TIE				
Fecal coliform	PE	120 mL	$Na_2S_2O_3$ and Store at 4ºC	8 hours
E. coli				
Hardness	PE	500 mL	Store at 4^0C	180 days
Metals				48 hours
Oil and Grease	Glass	1 L	HCL and Store at 4^0C	28 days
Total Suspended Solids (TSS)	PE	250 L	Store at 4^0C	7 days
Total Dissolved Solids (TDS)	PE	250 L	Store at 4^0C	7 days
Total Organic Carbon (TOC)	PE	250 L	H_2SO_4 and Store at 4^0C	728 days
Nitrate Nitrogen	PE	250 mL	Store at 4^0C	48 hours
Nitrite Nitrogen				
Orthophosphate-P				
Ammonia Nitrogen	Glass	250 mL	H_2SO_4 and Store at 4^0C	28 days
Total and Dissolved Phosphorus				
Nitrate + Nitrite (as N)				
Total Kjehdahl Nitrogen (TKN)	PE	250 mL	H_2SO_4 and Store at 4^0C	28 days
Mercury	Glass	500 mL	Store at 4^0C	48 Hours
Organics – OPs and pyrethroids in water	Amber glass	2 x 1 L	Store at 4^0C	7/40 days(3)
Total Dissolved Solids (TDS)	PE	1 Pint	Store at 4^0C	7 days
Chloride	PE	250-mL	Store at 4^0C	28 days
Total Phenols	Glass	1 L	H_2SO_4 and Store at 4^0C	28 days
Cyanide	PE	1 L	NaOH and Store at 4^0C	14 days
Total Petroleum Hydrocarbons	Glass	1 L	HCl or H_2SO_4 and Store at 4^0C	7/40 days(3)

Parameter	Sample Container	Sample Volume[(1)]	Immediate Processing and Storage	Holding Time
Chemical Oxygen Demand	PE	500 mL	H_2SO_4 and Store at 4^0C	28 days
Biochemical Oxygen Demand	PE	1L	Store at 4^0C	48 hours
Alkalinity	PE	500 mL	Store at 4^0C	14 days
Specific Conductivity	PE	500 mL	Store at 4^0C	28 days
MBAS	PE	1 L	Store at 4^0C	48 hours
Fluoride	PE	500 mL	None required	28 days
Perchlorate	PE	500 mL	Store at 4^0C	28 days
Volatile Suspended Solids	PE	250 mL	Store at 4^0C	7 days
Semivolatile Organic Compounds	Glass	2 x 1 L	Store at 4^0C	7 days
Volatile Organic Compounds	VOA	3 x 40 mL	HCl and Store at 4^0C	14 days
Herbicides	Glass	2 x 40mL	Thiosulfate and Store at 4^0C	14 days

PE – Polyethylene

1. Additional volume may be required for QC analyses.
2. Tests should be initiated within 36 hours of collection. The 36-hour hold time does not apply to subsequent analyses for TIEs. For interpretation of toxicity results, samples may be split from toxicity samples in the laboratory and analyzed for specific chemical parameters. All other sampling requirements for these samples are as specified in this document for the specific analytical method. Results of these analyses are not for any other use (e.g. characterization of ambient conditions) because of potential holding time exceedances and variance from sampling requirements.
3. 7/40 = 7 days to extract and 40 days from extraction to analysis.
4. Sample containers, volumes, storage, processing, and holding requirements may vary according to analytical method and laboratory. Typical requirements based on the methods listed in Table F-2 are provided here, but are subject to change upon selection and consultation with the analytical laboratory.

1.4 Aquatic Toxicity Testing and Toxicity Identification Evaluations

Aquatic toxicity testing supports the identification of best management practices (BMPs) to address sources of toxicity in urban runoff. The following outlines the approach for conducting aquatic toxicity monitoring and evaluating results. Control measures and management actions to address confirmed toxicity caused by urban runoff are addressed by the EWMP, either via currently identified management actions or those that are identified via adaptive management of the EWMP.

The approach to conducting aquatic toxicity monitoring is presented in **Figure F-1** which describes a general evaluation process for each sample collected as part of routine sampling conducted twice per year in wet weather and once per year in dry weather. Monitoring begins in the receiving water and the information gained is used to identify constituents for monitoring at outfalls to support the identification of pollutants that need to be addressed in the EWMP. The sub-sections below describe the process and its technical and logistical rationale.

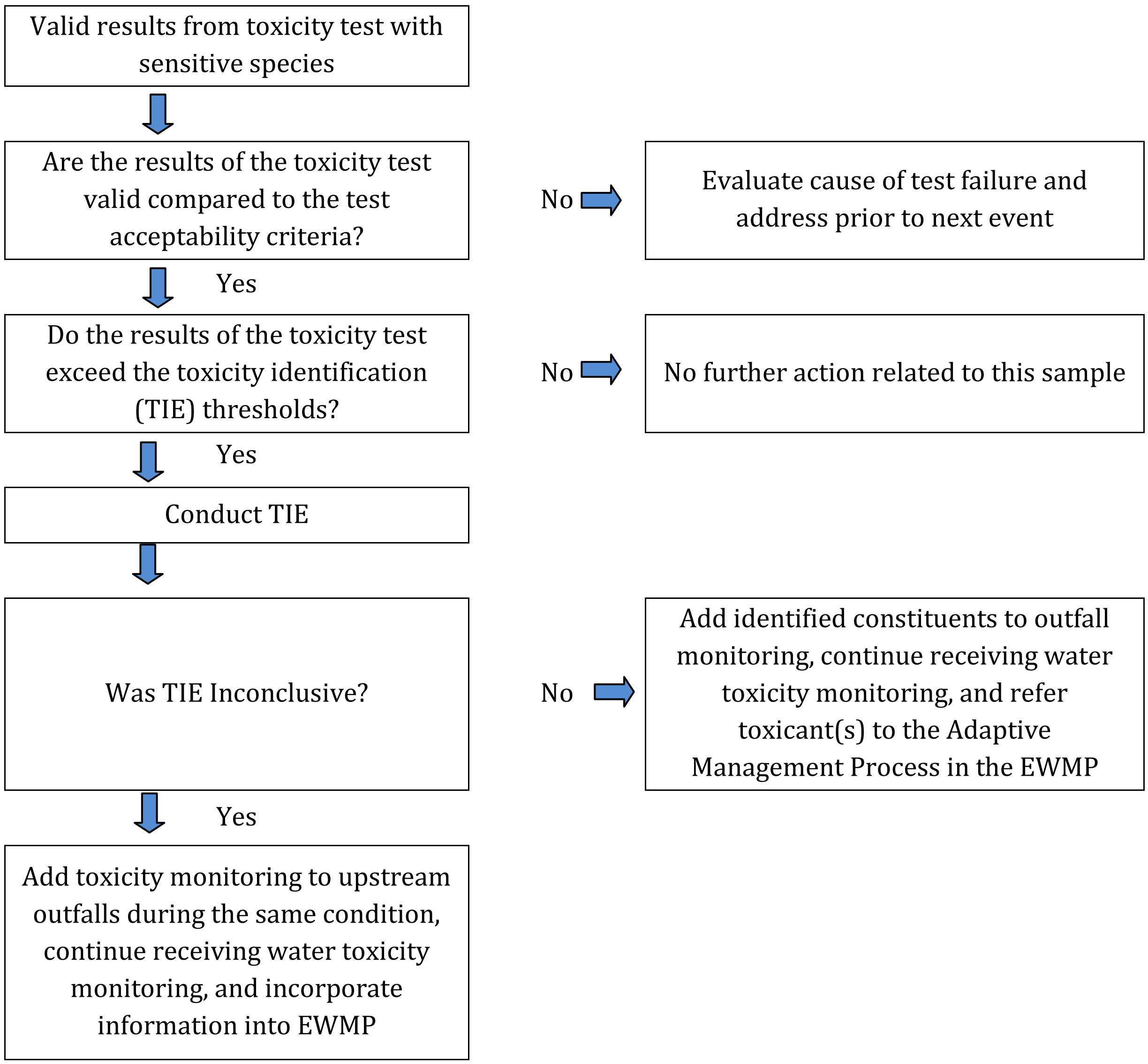


Figure F-1. Generalized Aquatic Toxicity Assessment Process

1.4.1 Sensitive Species Selection

The Permit Monitoring and Reporting Program (MRP) (page E-32) states that a sensitivity screening to select the most sensitive test species should be conducted unless “a sensitive test species has already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s), then monitoring shall be conducted using only that test species.” Previous relevant studies conducted in the watershed should be considered. Such studies may have been completed via previous MS4 sampling, wastewater NPDES sampling, or special studies conducted within the watershed. The following discusses the species section process for assessing aquatic toxicity in receiving waters.

As described in the MRP (page E-31), if samples are collected in receiving waters with salinity less than1 part per thousand (ppt), or from outfalls discharging to receiving waters with salinity less than 1 ppt, toxicity tests should be conducted on the most sensitive test species in accordance with species and short-term test methods in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136). The freshwater test species identified in the MRP are:

- A static renewal toxicity test with the fathead minnow, *Pimephales promelas* (Larval Survival and Growth Test Method 1000.04).
- A static renewal toxicity test with the daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.05).
- A static renewal toxicity test with the green alga, *Selenastrum capricornutum* (also named *Raphidocelis subcapitata*) (Growth Test Method 1003.0).

The three test species were evaluated to determine if either a sensitive test species had already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s). In reviewing the toxicity 303(d) listing for Reach 6 of the Santa Clara River, it was based upon toxicity testing of *Ceriodaphnia dubia*.

Ceriodaphnia dubia has been reported as a sensitive test species for historical and current use pesticides and metals, and studies indicate that it is more sensitive to the toxicants of concern than *P. promelas* or *S. capricornutum*. In its aquatic life copper criteria document, the USEPA reports greater sensitivity of *C. dubia* to copper (species mean acute value of 5.93 µg/l) compared to *Pimephales promelas* (species mean acute value of 69.93 µg/l; EPA, 2007). *C. dubia*'s relatively higher sensitive to metals is common across multiple metals. Additionally, researchers at the University of California, Davis reviewed available reported species sensitivity values in developing pesticide criteria for the Central Valley Regional Water Quality Control Board. The UC Davis researchers reported higher sensitivity of *C. dubia* to diazinon and bifenthrin (species mean acute value of 0.34 µg/l and 0.105 µg/l) compared to *P. promelas* (species mean acute value of 7804 µg/l and 0.405 µg/l; Palumbo et al., 2010a,b). Additionally, a study of the City of Stockton urban stormwater runoff found acute and chronic toxicity to *C. dubia*, with no toxicity to *S. capricornutum* or *P. promelas* (Lee and Lee, 2001). The toxicity was attributed to organophosphate pesticides, indicating a higher sensitivity of *C. dubia* compared to *S. capricornutum* or *P. promelas* While *P. promelas* is generally less sensitive to metals and pesticides, this species can be more sensitive to ammonia than *C. dubia*. However, as ammonia is not typically a constituent of concern for urban runoff and ammonia is not consistently observed above the toxic thresholds in the watershed, *P. promelas* is not considered a particularly sensitive species for evaluating the impacts of urban runoff in receiving waters in the watershed.

While *Selenastrum capricornutum* is a species sensitive to herbicides; however, while sometimes present in urban runoff, herbicides are not identified as a potential toxicant in the watershed.

Additionally, *S. capricornutum* is not considered the most sensitive species as it is not sensitive to pyrethroids or organophosphate pesticides and is not as sensitive to metals as *C. dubia*. Additionally, the *S. capricornutum* growth test can be affected by high concentrations of suspended and dissolved solids, color, and pH extremes, which can interfere with the determination of sample toxicity. As a result, it is common to manipulate the sample by centrifugation and filtration to remove solids to conduct the test; however, this process may affect the toxicity of the sample. In a study of urban highway stormwater runoff (Kayhanian et. al, 2008), the green alga response to the stormwater samples was more variable than the *C. dubia* and the *P. promelas* and in some cases the alga growth was possibly enhanced due to the presence of stimulatory nutrients. Also, in a study on the City of Stockton urban stormwater runoff (Lee and Lee, 2001) the *S. capricornutum* tests rarely detected toxicity where the *C. dubia* and the *P. promelas* regularly detected toxicity.

As *C. dubia* is identified as the most sensitive to known potential toxicant(s) typically found in receiving waters and urban runoff in the freshwater portions of the watershed and has demonstrated toxicity as this organism is the basis of a 303(d) toxicity listing in the watershed, *C. dubia* is selected as the most sensitive species. The species also has the advantage of being easily maintained by means of in-house mass cultures. The simplicity of the test, the ease of interpreting results, and the smaller volume necessary to run the test, make the test a valuable screening tool. The ease of sample collection and higher sensitivity will support assessing the presence of ambient receiving water toxicity or long term effects of toxic stormwater over time. As such, toxicity testing in the freshwater portions of the watershed will be conducted using *C. dubia*. However, *C. dubia* test organisms are typically cultured in moderately hard waters (80-100 mg/L $CaCO_3$) and can have increased sensitivity to elevated water hardness greater than 400 mg/L $CaCO_3$), which is beyond their typical habitat range. Because of this, in instances where hardness in site waters exceeds 400 mg/L ($CaCO_3$), an alternative test species may be used. *Daphnia magna* is more tolerant to high hardness levels and is a suitable substitution for *C. dubia* in these instances (Cowgill and Milazzo, 1990).

1.4.2 Testing Period

The following describes the testing periods to assess toxicity in samples collected in the USCR EWMP area during dry and wet weather conditions. Although wet weather conditions in the region generally persist for less than the chronic testing periods (7 days), the *C. dubia* chronic test will be used for wet weather toxicity testing in accordance with Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA, 2002b). Utilization of chronic tests on wet weather samples are not expected to generate results representative of the typical conditions found in the receiving water intended to be simulated by toxicity testing.

Chronic toxicity tests will be used to assess both survival and reproductive/growth endpoints for *C. dubia* in dry weather samples. Chronic testing will be conducted on undiluted samples in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (USEPA, 2002a).

1.4.3 Toxicity Endpoint Assessment and Toxicity Identification Evaluation Triggers

Per the MRP, toxicity test endpoints will be analyzed using the Test of Significant Toxicity (TST) t-test approach specified by the USEPA (USEPA, 2010). The Permit specifies that the chronic in-stream waste concentration (IWC) is set at 100% receiving water for receiving water samples and 100% effluent for outfall samples. Using the TST approach, a t-value is calculated for a test result and compared with a critical t-value from USEPA's TST Implementation Document (USEPA, 2010). Follow-up triggers are generally based on the Permit specified statistical assessment as described below.

For chronic *C. dubia* toxicity testing, if a ≥50% reduction in survival or reproduction is observed between the sample and laboratory control that is statistically significant, a toxicity identification evaluation (TIE) will be performed.

TIE procedures will be initiated as soon as possible after the toxicity trigger threshold is observed to reduce the potential for loss of toxicity due to extended sample storage. If the cause of toxicity is readily apparent or is caused by pathogen related mortality (PRM) or epibiont interference with the test, the result will be rejected. If necessary, a modified testing procedure will be developed for future testing.

In cases where significant endpoint toxicity effects ≥50% are observed in the original sample, but the follow-up TIE baseline "signal" is not statistically significant, the cause of toxicity will be considered non-persistent. No immediate follow-up testing is required on the sample. However, future test results should be evaluated to determine if parallel TIE treatments are necessary to provide an opportunity to identify the cause of toxicity.

1.4.4 Toxicity Identification Evaluation Approach

The results of toxicity testing will be used to trigger further investigations to determine the cause of observed laboratory toxicity. The primary purpose of conducting TIEs is to support the identification of management actions that will result in the removal of pollutants causing toxicity in receiving waters. Successful TIEs will direct monitoring at outfall sampling sites to inform management actions. As such, the goal of conducting TIEs is to identify pollutant(s) that should be sampled during outfall monitoring so that management actions can be identified to address the pollutant(s).

The TIE approach is divided into three phases as described in USEPA's 1991 Methods for Aquatic Toxicity Identification Evaluations – Phase I Toxicity Characterization Procedures – Second Edition (EPA/600/6-9/003) and briefly summarized as follows:

- Phase I utilizes methods to characterize the physical/chemical nature of the constituents which cause toxicity. Such characteristics as solubility, volatility and filterability are determined without specifically identifying the toxicants. Phase I results are intended as a first step in specifically identifying the toxicants but the data generated can also be used to develop treatment methods to remove toxicity without specific identification of the toxicants.
- Phase II utilizes methods to specifically identify toxicants.
- Phase III utilizes methods to confirm the suspected toxicants.

A Phase I TIE will be conducted on samples that exceed a TIE trigger described in **Section 1.4.3**. Water quality data will be reviewed to support future evaluation of potential toxicants. A range of sample manipulations may be conducted as part of the TIE process. The most common manipulations are described in **Table F-5**. Information from previous chemical testing and/or TIE efforts will be used to determine which of these (or other) sample manipulations are most likely to provide useful information for identification of primary toxicants. TIE methods will generally adhere to USEPA procedures documented in conducting TIEs (USEPA, 1991, 1992, 1993a-b).

Table F-5. Aquatic Toxicity Identification Evaluation Sample Manipulations

TIE Sample Manipulation	Expected Response
pH Adjustment (pH 7 and 8.5)	Alters toxicity in pH sensitive compounds (i.e., ammonia and some trace metals)
Filtration or centrifugation*	Removes particulates and associated toxicants
Ethylenedinrilo-Tetraacetic Acid (EDTA) or Cation Exchange Column*	Chelates trace metals, particularly divalent cationic metals
Sodium thiosulfate (STS) addition	Reduces toxicants attributable to oxidants (i.e., chlorine) and some trace metals
Piperonyl Butoxide (PBO)*	Reduces toxicity from organophosphate pesticides such as diazinon, chlorpyrifos and malathion, and enhances pyrethroid toxicity
Carboxylesterase addition(1)	Hydrolyzes pyrethroids
Temperature adjustments(2)	Pyrethroids become more toxic when test temperatures are decreased
Solid Phase Extraction (SPE) with C18 column*	Removes non-polar organics (including pesticides) and some relatively non-polar metal chelates
Sequential Solvent Extraction of C18 column	Further resolution of SPE-extracted compounds for chemical analyses
No Manipulation*	Baseline test for comparing the relative effectiveness of other manipulations

* Denotes treatments that will be conducted during the initiation of toxicity monitoring, but may be revised as the program is implemented. These treatments were recommended for initial stormwater testing in Appendix E (Toxicity Testing Tool for Storm Water Discharges) of the State Water Resources Control Board's June 2012 Public Review Draft "Policy for Toxicity Assessment and Control".

1. Carboxylesterase addition has been used in recent studies to help identify pyrethroid-associated toxicity (Wheelock et al., 2004; Weston and Amweg, 2007). However, this treatment is experimental in nature and should be used along with other pyrethroid-targeted TIE treatments (e.g., PBO addition).
2. Temperature adjustments are another recent manipulation used to evaluate pyrethroid-associated toxicity. Lower temperatures increase the lethality of pyrethroid pesticides (Harwood, You and Lydy, 2009).

The Watershed Management Group will identify the cause(s) of toxicity using the treatments in **Table F-5** and, if possible, using the results of water column chemistry analyses. After any initial determinations of the cause of toxicity, the information may be used during future events to modify the targeted treatments to more closely target the expected toxicant or to provide additional treatments to narrow the toxicant cause(s). Moreover, if the toxicant or toxicant class is not initially identified, toxicity monitoring during subsequent events will confirm if the toxicant is persistent or a short-term episodic occurrence.

As the primary goals of conducting TIEs is to identify pollutants for incorporation into outfall monitoring, narrowing the list of toxicants following Phase I TIEs via Phase II or III TIEs is not necessary if the toxicant class determined during the Phase I TIE is sufficient for 1) identifying additional pollutants for outfall monitoring and/or 2) identifying control measures. Thus, if the specific pollutant(s) or the analytical class of pollutant (e.g., metals that are analyzed via EPA Method 200.8) are identified then sufficient information is available to inform the addition of pollutants to outfall monitoring.

Phase II TIEs may be utilized to identify specific constituents causing toxicity in a given sample if the results of Phase I TIE testing and a review of available chemistry data fails to provide information necessary to identify constituents what warrant additional monitoring activities or management actions to identify likely sources of the toxicants and lead to elimination of the sources of these contaminants. Phase III TIEs will be conducted following any Phase II TIEs.

For the purposes of determining whether a TIE is inconclusive, TIEs will be considered inconclusive if:

- The toxicity is persistent (i.e., observed in the baseline), and
- The cause of toxicity cannot be attributed to a class of constituents (e.g., insecticides, metals, etc.) that can be targeted for monitoring.

If (1) a combination of causes that act in a synergistic or additive manner are identified, (2) the toxicity can be removed with a treatment or via a combination of the TIE treatments, or (3) the analysis of water quality data collected during the same event identify the pollutant or analytical class of pollutants, the result of a TIE is considered conclusive.

In cases where significant endpoint toxicity effects greater than 50% are observed in the original sample, but the follow-up TIE baseline "signal" is not statistically significant, the cause of toxicity will be considered non-persistent. No immediate follow-up testing is required on the sample. However, future test results should be evaluated to determine if parallel TIE treatments are necessary to provide an opportunity to identify the cause of toxicity.

Note that the MRP (page E-33) allows a TIE Prioritization Metric (as described in Appendix E of the Stormwater Monitoring Coalition's (SMC) Model Monitoring Program) for use in ranking sites for TIEs. However, as the extent to which TIEs will be conducted is unknown, prioritization cannot be conducted at this time. However, prioritization may be utilized in the future based on the results of toxicity monitoring and an approach to prioritization will be developed through the CIMP adaptive management process and will be described in future versions of the CIMP.

1.4.5 Follow Up on Toxicity Testing Results

Per Parts VIII.B.c.vi and XI.G.1.d of the MRP, if the results of a TIE on a receiving sample are inconclusive, a toxicity test conducted during the same condition (i.e., wet or dry weather), using the same test species, will be conducted at applicable upstream outfalls as soon as feasible (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of an inconclusive TIE). The same TIE evaluation triggers and TIE approach presented in **Sections 1.4.3** and **1.4.4**, respectively will be followed based on the results of the outfall sample.

If a toxicant or class of toxicants is identified through a TIE, the MRP (page E-33) indicates the following actions should be taken:

1. USCRWMG Members shall analyze for the toxicant(s) during the next scheduled sampling event in the discharge from the outfall(s) upstream of the receiving water location.
2. If the toxicant is present in the discharge from the outfall at levels above the applicable receiving water limitation, a toxicity reduction evaluation (TRE) will be performed for that toxicant.

The list of constituents monitored at outfalls identified in the CIMP will be modified based on the results of the TIEs. Monitoring for those constituents identified based on the results of a TIE will occur as soon as feasible following the completion of a successful TIE (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of a successful TIE).

The requirements of the TREs will be met as part of the adaptive management process in the EWMP rather than conducted via the CIMP. The identification and implementation of control measures to address the causes of toxicity are tied to management of the stormwater program, not the CIMP. It is expected that the requirements of TREs will only be conducted for toxicants that are not already addressed by an existing Permit requirement (i.e., TMDLs) or existing or planned management actions.

1.4.6 Summary of Aquatic Toxicity Monitoring

The approach to conducting aquatic toxicity monitoring as described in the previous sections is summarized in detail in **Figure F-1**. The intent of the approach is to identify the cause of toxicity observed in receiving water to the extent possible with the toxicity testing tools available, thereby directing outfall monitoring for the pollutants causing toxicity with the ultimate goal of supporting the development and implementation of management actions.

1.5 Bio-Assessment/Macrobenthic Community Assessment

The Los Angeles County Flood Control District has indicated that it will continue its participation in the SMC Regional Bioassessment Monitoring Program on behalf of the USCRWMG. Thus no specific monitoring and analytical procedures are included in the CIMP at this time. If in the future, such monitoring is necessary under this program, the CIMP will be revised to include appropriate procedures.

1.6 Laboratory Identification

Laboratories will be chosen based on their ability to meet the measurement quality objectives set forth in **Table F-2** and **Table F-3**. Laboratories are required to meet ELAP and/or NELAP certifications and any data quality requirements specified in this document. Due to contracting procedures and solicitation requirements, qualified laboratories have not yet been selected to carry out the analytical responsibilities described in this CIMP. Following the completion of the first monitoring year, the CIMP will be updated to include the pertinent laboratory specific information. At the end of all future monitoring years in the Permit cycle, the Project Manager and Project QA Manager will assess the laboratories performance and at that time a new laboratory may be chosen.

1.6.1 Alternate Laboratories

In the event that the laboratories selected to perform analyses for the SCR CIMP are unable to fulfill data quality requirements outlined herein (*e.g.*, due to instrument malfunction), alternate laboratories need to meet the same requirements that the primary labs have met. The original laboratory selected may recommend a qualified laboratory to act as a substitute. However, the final decision regarding alternate laboratory selection rests with the Project Manager and Project QA Manager.

2 Sampling Methods and Sample Handling

The following sections describe the steps to be taken to properly prepare for and initiate water quality sampling for the SCR CIMP.

2.1 Monitoring Event Preparation

Monitoring event preparation includes preparation of field equipment, placing bottle orders, and contacting the necessary personnel regarding site access and schedule. The following steps will be completed two weeks prior to each sampling event (a condensed timeline may be appropriate in storm events, which may need to be completed on short notice):

1. Contact laboratories to order sample containers and to coordinate sample transportation details.
2. Confirm scheduled monitoring date with field crew(s), and set-up sampling day itinerary including sample drop-off.
3. Prepare equipment.
4. Prepare sample container labels and apply to bottles.
5. Prepare the monitoring event summary and field log sheets to indicate the type of field measurements, field observations and samples to be collected at each of the monitoring sites.

6. Verify that field measurement equipment is operating properly (*i.e.*, check batteries, calibrate, etc.)

Table F-6 provides a checklist of field equipment to prepare prior to each monitoring event.

Table F-6. Field Equipment Checklist

☐	Monitoring Plan
☐	Sample Containers plus Extras with Extra Lids
☐	Pre-Printed, Waterproof Labels (extra blank sheets)
☐	Event Summary Sheets
☐	Field Log Sheets or Electronic Device (e.g., laptop or tablet)
☐	Chain of Custody Forms
☐	Bubble Wrap
☐	Coolers with Ice
☐	Tape Measure
☐	Paper Towels or “Rags in a Box”
☐	Safety Equipment
☐	First Aid Kit
☐	Cellular Telephone
☐	Gate Keys
☐	Hip Waders
☐	Plastic Trash Bags
☐	Sealable Plastic Bags
☐	Grab Pole
☐	Cable Ties (assorted sizes)
☐	Clean Secondary Container(s)
☐	Field Measurement Equipment
☐	Spare Batteries for Field Meters
☐	New Powder-Free Nitrile Gloves
☐	Pens and Pencils
☐	Stop Watch
☐	Camera
☐	Blank Water
☐	Calibrated Bucket or Container

2.1.1 Bottle Order/Preparation

Sample container orders will be placed with the appropriate analytical laboratory at least two weeks prior to each sampling event. Containers will be ordered for all water samples, including quality control samples, as well as extra containers in case the need arises for intermediate containers or a replacement. The containers must be the proper type and size and contain preservative as appropriate for the specified laboratory analytical methods. **Table F-4** presents the proper container type, volume, and immediate processing and storage needs. The field crew must inventory sample containers upon receipt from the laboratory to ensure that adequate containers have been provided to meet analytical requirements for each monitoring event. After each event, any bottles used to collect water samples will be cleaned by the laboratory and either picked up by or shipped to the field crew.

2.1.2 Container Labeling and Sample Identification Scheme

All samples will be identified with a unique identification code to ensure that results are properly reported and interpreted. Samples will be identified such that the site, sampling location, matrix, sampling equipment and sample type (i.e., environmental sample or QC sample) can be distinguished by a data reviewer or user. Sample identification codes should consist of a site identification code, a matrix code, and a unique sample ID number. Alternative sample and data management schemes can be used, if they provide the essential information listed here. Using the format previously described, sample ID codes may be structured as *SCR*- ###.# - *AAAA* - *XXX,* where:

- *SCR* indicates that the sample was collected as part of the SCR CIMP.
- *###*- identifies the sequentially numbered monitoring event, and # is an optional indicator for re-samples collected for the same event. Sample events are numbered from 001 to 999 and will not be repeated.
- *AAAA* indicates the unique site identification code assigned to each site.
- XXX identifies the sample number unique to a sample bottle collected for a single event. Sample bottles are numbered sequentially from 001 to 999 and will not be repeated within a single event.

Custom bottle labels should be produced using blank waterproof labels and labeling software. Labels will be placed on the appropriate bottles in a dry environment; applying labels to wet sample bottles should be avoided. Labels should be placed on sides of bottles rather than on bottle caps. All sample containers will be pre-labeled before each sampling event to the extent practicable. Pre-labeling sample containers simplifies field activities, leaving only sample collection time and date and field crew initials to be filled out in the field. Custom labels will be produced using blank water-proof labels. This approach will allow the site and analytical constituent information to be entered in advance and printed as needed prior to each monitoring event. Labels should include the following information:

- Program Name
- Station ID
- Sample ID
- Date
- Collection Time
- Sampling Personnel
- Sampling Agency/Firm
- Analytical Requirements
- Preservative Requirements
- Analytical Laboratory

2.1.3 Field Meter Calibration

Calibration of field measurement equipment is performed as described in the owner's manuals for each individual instrument. Each individual field crew will be responsible for calibrating their field measurement equipment. Field monitoring equipment must meet the requirements outlined in **Table F-1** and be calibrated before field events based on manufacturer guidance, but at a minimum prior to each event. **Table F-7** outlines the typical field instrument calibration procedures for each piece of equipment requiring calibration. All calibrations will be documented on each event's calibration log sheet (presented in **Appendix 3**).

If calibration results do not meet manufacturer specifications, the field crew should first try to recalibrate using fresh aliquots of calibration solution. If recalibration is unsuccessful, new calibration solution should be used and/or maintenance should be performed. Each attempt should be recorded on the equipment calibration log. If the calibration results cannot meet manufacturer's specifications, the field crew should use a spare field measuring device that can be successfully calibrated. Additionally, the Project Manager should be notified.

Calibration should be verified using at least one calibration fluid within the expected range of field measurements, both immediately following calibration and at the end of each monitoring day. Individual parameters should be recalibrated if the field meters do not measure a calibration fluid within the range of accuracy presented in **Table F-7**. Calibration verification documentation will be retained in the event's calibration verification log (presented in **Appendix 3**).

Table F-7. Calibration of Field Measurement Equipment

Equipment / Instrument	Calibration and Verification Description	Frequency of Calibration	Frequency of Calibration Verification	Responsible Party
pH Probe	Calibration for pH measurement is accomplished using standard buffer solutions. Analysis of a mid-range buffer will be performed to verify successful calibration.	Day prior to 1st day or 1st day of sampling event	After each day's calibration and at the end of the sampling day	Individual Sampling Crews
Temperature	Temperature calibration is factory-set and requires no subsequent calibration.			
Dissolved Oxygen Probe	Calibration for dissolved oxygen measurements is accomplished using a water saturated air environment. Dissolved oxygen (DO) measurement of water-saturated air will be performed and compared to a standard table of DO concentrations in water as a function of temperature and barometric pressure to verify successful calibration.			
Conductivity	Conductivity calibration will follow manufacturer's specifications. A mid-range conductivity standard will be analyzed to verify successful calibration.			

2.1.4 Weather Conditions

Monitoring will occur during conditions that are defined as "dry" and "wet". Antecedent conditions will be based on the LA County Department of Public Works (LACDPW) rain gage listed in Table F-8. Dry weather is defined as when the flow of the receiving water body is less than 20 percent greater than the base flow. Wet weather conditions are when the receiving water body has flow that is at least 20 percent greater than its base flow. In addition, the first significant rain event of the storm year (first flush) will be monitored. The targeted storm events for wet weather sampling will be selected based on a reasonable probability that the events will result in substantially increased flows in the Santa Clara River over at least 12 hours. Sufficient precipitation is needed to produce runoff and increase flow. The decision to sample a storm event will be made in consultation with weather forecasting information services after a quantitative precipitation forecast (QPF) has been determined. All efforts will be made to collect wet weather samples from all sites during a single targeted storm event. However, safety or other factors may make it infeasible to collect samples from the same storm event. For a storm to be tracked, the first flush event will have a predicted rainfall of at least 1 inch at a 70 percent probability of rainfall at least 24 hours prior to the event start time. The one inch minimum rainfall trigger for storm water sampling was selected based on the Santa Clara River rainfall and flow data record. A graph of peak flow data and rainfall at the Old Road Bridge Gaging Station located in Reach 5 is provided to support this decision. The USCR watershed has vast areas of undeveloped land and significant areas of high infiltration rates, which include the channels themselves, as most are natural, sandy-bottomed, necessitating significant rainfall to result in sustained and measurable flows in the river and its tributaries. Also, the 85th percentile rainfall depth in the Upper Santa Clara River Watershed ranges between 0.65 and 1.44 inches. Therefore, the predicted one inch rainfall trigger for storm sampling coincides with the average 85th percentile rainfall depth for the watershed. Subsequent storm events must meet the tracking requirements and flow objectives as well as be separated by a minimum of three days of dry conditions (less than 0.1 inches of rain each day).[1]

[1] Because a significant storm event is based on predicted rainfall, it is recognized that this monitoring may be triggered without the predicted rainfall actually occurring. In this case, the monitoring event will still qualify as meeting this requirement provided that sufficient sample volume is collected to do all required laboratory analysis. Documentation will be provided showing the predicted rainfall amount.

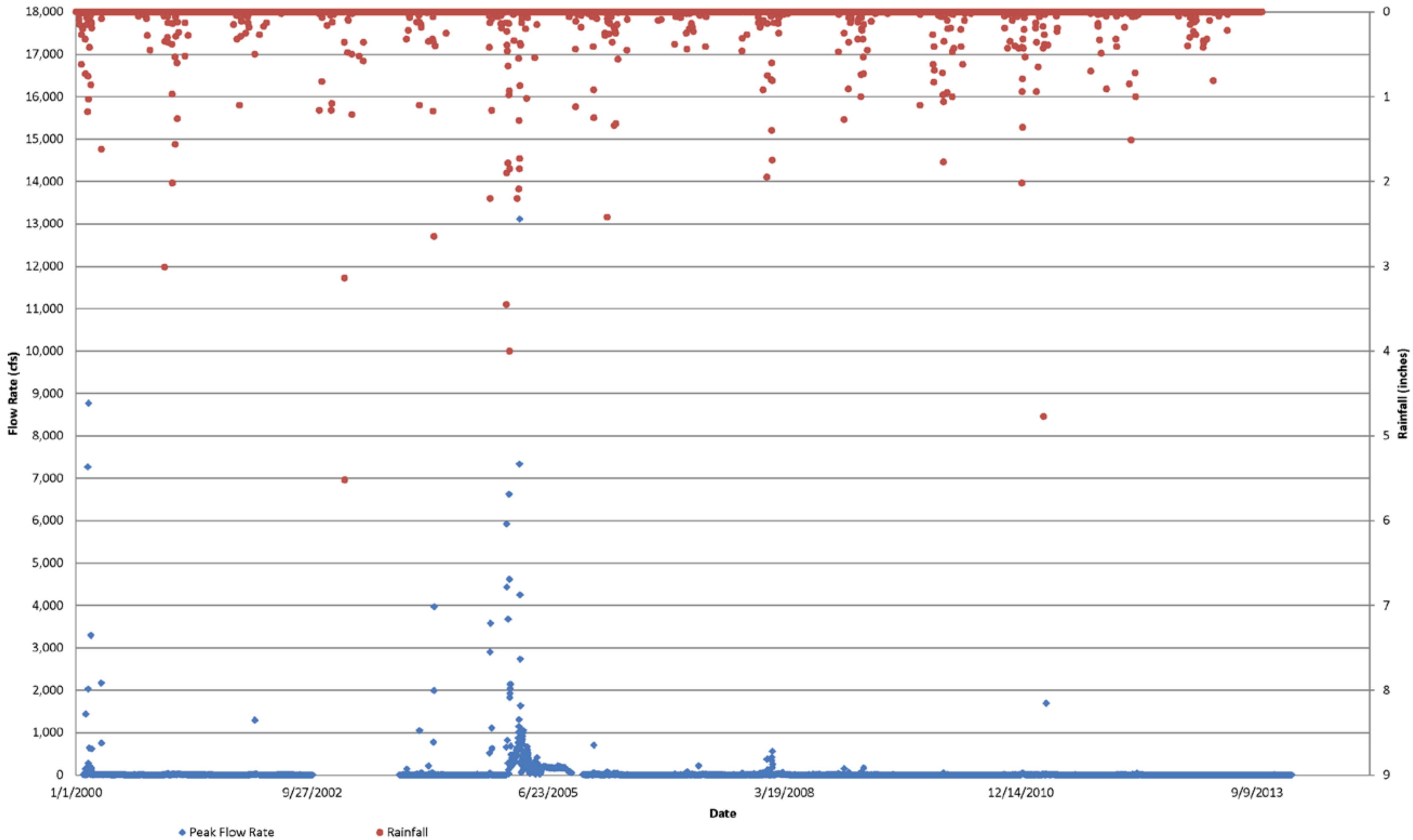


Figure F-2. Peak Flow Rate and Rainfall Data for Santa Clara River Reach 5 at the Old Road Bridge[2]

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[2] Graph provided by Los Angeles County Department of Public Works.

Antecedent conditions will be based on the LA County Department of Public Works (LACDPW) rain gages listed in **Table F-8**. The rain gage stations are owned and operated by the County of Los Angeles. Data can be obtained at http://dpw.lacounty.gov/wrd/Precip/index.cfm by clicking the 'See Data' link in the "Near Real-Time Precipitation Map" section. The web page displays a map showing real-time rainfall totals (in inches) for different rain gages. Although the default precipitation period is 24 hours, the user can view rainfall totals over different durations. Data from the rain gages is updated every 10 minutes.

Table F-8. Real-Time Rain Gage Used to Define Weather Conditions for CIMP Monitoring[1]

Jurisdictional Group	Rainfall Gage	Gage Type
Santa Clara River Watershed	406 Newhall – FS #73	LACDPW ALERT Rainfall Gage
Santa Clara River Watershed	390 Bouquet Cyn @ Urbandale	LACDPW ALERT Rainfall Gage
Santa Clara River Watershed	385 Castaic Junction	LACDPW ALERT Rainfall Gage

1. Station information for these rain gages can be found at http://dpw.lacounty.gov/wrd/Precip/alertlist.cfm

For the purpose of triggering wet weather sampling preparation, field staff can estimate that any rainfall prediction for the City of Santa Clarita of 1 or more inches in a 6- to 12-hour period would be sufficient to mobilize for wet weather sampling, or by utilizing the analyses of the CMP staff.[3] The sampling crew should prepare to depart at the forecasted time of initial rainfall. In instances of composite sampling, the first of the four manual composite samples should be targeted for collection within 2 hours of local rainfall.

Publicly available meteorological forecasting systems are suggested for identifying and anticipating storm event sampling. The sampling decision protocol begins when the sampling crew recognizes an approaching storm, through weekly monitoring of forecasts. The National Weather Service's weather forecast for Santa Clarita can be accessed on-line at:

http://www.wrh.noaa.gov/lox/ then click on "Santa Clarita" on the area map

From the forecast page, the link to "Quantitative Precipitation Forecast" provides forecasted precipitation in inches for the next 24 hours, in 3-hour increments for the first 12 hours and in 6-hour increments for the last 12 hours. The "SAUC1:SAUGUS" Los Angeles County site is located in the City of Santa Clarita and will be used to forecast precipitation in the EWMP Group

[3] Because a significant storm event is based on predicted rainfall, it is recognized that this monitoring may be triggered without 1" of rainfall actually occurring. In this case, the monitoring event will still qualify as meeting this requirement provided that sufficient sample volume is collected to do all required laboratory analysis. Documentation will be provided showing the predicted rainfall amount.

area. Wet weather monitoring will commence when the "SAUC1:SAUGUS" site is predicted at a 70 percent probability to receive at least 1 inch of rain 24 hours before the onset of rainfall.

2.1.5 Flow Gage Measurements

USGS flow gages along the Santa Clara River can be used to determine whether the receiving water flow has exceeded 20 percent of baseflow. In addition to the USGS rain gages, field crews will monitor flow at each of the sampling sites. **Table F-9** presents the location of the flow gage located on the Santa Clara River.

Table F-9. Santa Clara River Flow Gage

Waterbody	Water Body Type	Gage Location	Gage ID
Santa Clara River	Main Stem	Reach 5 downstream of the EWMP area	11109000

2.2 Sample Handling

Proper sample handling ensures the samples will comply with the monitoring methods and analytical hold time and provides traceable documentation throughout the history of the sample.

2.2.1 Documentation Procedures

The Project Manager is responsible for ensuring that each field sampling team adheres to proper custody and documentation procedures. Field log sheets documenting sample collection and other monitoring activities for each site will be bound in a separate master logbook for each event or saved in an event specific electronic file. Field personnel have the following responsibilities:

- Keep an accurate written record of sample collection activities on the field log sheets.
- Ensure that all field log sheet entries are legible and contain accurate and inclusive documentation of all field activities.
- Note errors or changes using a single line to cross out the entry and date and initial the change.
- Ensure that a label is affixed to each sample collected and that the labels uniquely identify samples with a sample ID, site ID, date and time of sample collection and the sampling crew initials.
- Complete the chain of custody forms accurately and legibly.

2.2.2 Field Documentation/Field Log

Field crews will keep a field log book (or electronic file(s) if tablets or laptops are used) for each sampling event that contains a calibration log sheet, a field log sheet for each site, and appropriate contact information. The following items should be recorded on the field log sheet for each sampling event:

- Monitoring station location (Site ID);
- Date and time(s) of sample collection;
- Name(s) of sampling personnel;
- Sample collection depth;
- Sample ID numbers and unique IDs for any replicate or blank samples;
- QC sample type (if appropriate);
- Requested analyses (specific parameters or method references);
- Sample type, (*e.g.*, grab or composite);
- The results of field measurements (*e.g.*, flow, temperature, dissolved oxygen, pH, conductivity) and the time that measurements were made;
- Qualitative descriptions of relevant water conditions (*e.g.*, water color, flow level, clarity) or weather (*e.g.*, wind, rain) at the time of sample collection;
- Trash observations (presence/absence);
- A description of any unusual occurrences associated with the sampling event, particularly those that may affect sample or data quality.

The field log will be scanned into a PDF and transmitted along with the Post-Event Summary Report to the Project Manager within one week of the conclusion of each sampling event. **Appendix 3** contains an example of the field log sheet.

2.2.3 Sample Handling and Shipment

The field crews will have custody of samples during each monitoring event. Chain-of-custody (COC) forms will accompany all samples during shipment to contract laboratories to identify the shipment contents. All water quality samples will be transported to the analytical laboratory by the field crew or by overnight courier. The original COC form will accompany the shipment, and a signed copy of the COC form will be sent, typically via fax, by the laboratory to the field crew to be retained in the project file.

While in the field, samples will be stored on ice in an insulated container, so that they will be kept at less than 6˚C. Samples that must be shipped to the laboratory must be examined to ensure that container lids are tight and placed on ice to maintain the temperature between 4^{o}C. The ice packed with samples must be approximately 2 inches deep at the top and bottom of the cooler, and must contact each sample to maintain temperature. The original COC form(s) will be double-bagged in re-sealable plastic bags and either taped to the outside of the cooler or to the inside lid. Samples must be shipped to the contract laboratory according to Department of Transportation standards. The method(s) of shipment, courier name, and other pertinent information should be entered in the "Received By" or "Remarks" section of the COC form.

Coolers must be sealed with packing tape before shipping, unless transported by field or lab personnel, and must not leak. It is assumed that samples in tape-sealed ice chests are secure whether being transported by common carrier or by commercial package delivery. The laboratory's sample receiving department will examine the shipment of samples for correct documentation, proper preservation and compliance with holding times.

The following procedures are used to prevent bottle breakage and cross-contamination:

- Bubble wrap or foam pouches are used to keep glass bottles from contacting one another to prevent breakage, re-sealable bags will be used if available.
- All samples are transported inside hard plastic coolers or other contamination-free shipping containers.
- If arrangements are not made in advance, the laboratory's sample receiving personnel must be notified prior to sample shipment.

All samples remaining after successful completion of analyses will be disposed of properly. It is the responsibility of the personnel of each analytical laboratory to ensure that all applicable regulations are followed in the disposal of samples or related chemicals.

Samples will be stored and transported at less than 6°C as noted in **Table F-4**. Samples not analyzed locally will be sent priority overnight on the same day that the sample collection process is completed. The individual sample containers containing the water samples for chemical analysis will be shipped to the analytical chemistry laboratory for analysis.

Samples will be delivered to the appropriate laboratory as indicated in **Table F-10**. Appropriate contacts are listed along with lab certification information.

Table F-10. Analytical Laboratories

Laboratory [1]	Analysis	Shipping Method	Contact	Phone	Address	Lab Certification No. & Expiration Date [2]

1. Information for all contracted laboratories will be added to this table following their selection and upon CIMP update.
2. Lab certifications are renewed on an annual basis.

2.2.4 Chain-of-Custody Forms

Sample custody procedures provide a mechanism for documenting information related to sample collection and handling. Sample custody must be traceable from the time of sample collection until results are reported. A sample is considered under custody if:

- It is in actual possession.
- It is in view after in physical possession.
- It is placed in a secure area (accessible by or under the scrutiny of authorized personnel only after in possession).

A COC form must be completed after sample collection and prior to sample shipment or release. The COC form, sample labels, and field documentation will be cross-checked to verify sample identification, type of analyses, number of containers, sample volume, preservatives, and type of containers. A complete chain-of-custody form is to accompany the transfer of samples to the analyzing laboratory. A typical chain-of-custody form is illustrated in **Appendix 3**.

2.2.5 Laboratory Custody Procedures

Contract laboratories will follow sample custody procedures as outlined in the laboratory's Quality Assurance (QA) Manual. A copy of each contract laboratory's QA Manual should be available at the laboratory upon request. Laboratories shall maintain custody logs sufficient to track each sample received and to analyze or preserve each sample within specified holding times. The following sample control activities must be conducted at the laboratory:

- Initial sample login and verification of samples received with the COC form;
- Document any discrepancies noted during login on the COC;
- Initiate internal laboratory custody procedures;
- Verify sample preservation (*e.g.*, temperature);
- Notify the Project Manager if any problems or discrepancies are identified; and,
- Perform proper sample storage protocols, including daily refrigerator temperature monitoring and sample security.

Laboratories shall maintain records to document that the above procedures are followed. Once samples have been analyzed, samples will be stored at the laboratory for at least 30 days (excluding bacteria samples). After this period, samples may be disposed of properly.

2.3 Field Protocols

Briefly, the key aspects of quality control associated with field protocols for sample collection for eventual chemical, microbiological, and toxicological analyses are as follows:

- Field personnel will be thoroughly trained in the proper use of sample collection gear and will be able to distinguish acceptable versus unacceptable water samples in accordance with pre-established criteria.
- Field personnel will be thoroughly trained to recognize and avoid potential sources of sample contamination (*e.g.*, engine exhaust, ice used for cooling, touching the inner surfaces of sample bottles or caps).
- Sampling gear and utensils which come in direct contact with the sample will be made of

non-contaminating materials (*e.g.*, borosilicate glass, high-quality stainless steel and/or Teflon™, according to protocol) and will be thoroughly cleaned between sampling stations according to appropriate cleaning protocol (rinsing thoroughly with laboratory reagent water at minimum).

- Sample containers will be of the recommended type and will be free of contaminants (*i.e.*, pre-cleaned and/or sterile).
- Conditions for sample collection, preservation and holding times will be followed.

Field crews will be comprised of two persons per crew, minimum. For safety reasons, sampling will occur during daylight hours, when possible. Sampling on weekends and holidays will also be avoided. Other constraints on sampling events include, but are not limited to lab closures and toxicity testing organism availability. Sampling events should proceed in the following manner:

1. Before leaving the sampling crew base of operations, confirm number and type of sample containers as well as the complete equipment list.
2. Proceed to the first sampling site.
3. Fill-out the general information on the field log sheet.
4. Collect the environmental and QA/QC samples indicated on the event summary sheet in the manner described in the CIMP and store samples as described in the CIMP. Using the field log sheet, confirm that all appropriate containers were filled.
5. Collect field measurements and observations, and record these on the field log sheet.
6. Repeat the procedures in steps 3, 4, and 5 for each of the remaining sampling sites.
7. Complete the chain-of-custody forms using the information on the field log sheets.
8. After sample collection is completed, deliver and/or ship samples to appropriate laboratory.

2.3.1 Invasive Species

Quagga mussels were recently found in Lake Piru, nearby the USCR EWMP Group area. Should the mussel infestation spread, there is potential for field staff to come in contact with this invasive species. Field personnel have the potential to further spread invasive species if proper precautions are not taken prior to, during, and after a sampling event. Information and procedures for controlling the spread of these organisms have been outlined by the CA Department of Fish and Wildlife, Quagga and Zebra Mussels Invasive Species Program (http://www.dfg.ca.gov/invasives/quaggamussel/) and the United States Fish and Wildlife Service Invasive Species Program (http://www.fws.gov/invasives/what-you-can-do.html). The Monitoring Manager may want to consider tracking this infestation and developing a Hazard Analysis and Critical Control Points (HACCP) planning document specific to the SCR CIMP.

2.3.2 Endangered Species

As previously described, the SCR CIMP includes monitoring of receiving waters and outfalls. Monitoring is performed under both wet and dry weather conditions. Outfalls are also subject to screening activities, which are to be performed during dry weather. There is potential during these monitoring activities for field staff to encounter threatened or endangered species found within the Santa Clara River. Fish species Catostomus santanae (Santa Ana sucker) is on the federal threatened species list and Gasterosteus aculeatus williamsoni (unarmored three-spined stickleback) is federally listed as endangered. Sampling crews may also encounter the endangered least Bell's vireo or other species of concern while performing sampling and screening activities.

Sampling crews are least likely to encounter endangered species during wet weather monitoring. Flows are at their peaks during storm events, allowing fish unimpeded movement in channels. Under these conditions, it may not be safe for field staff to enter the channels and work will likely be performed from the banks. Dry weather sampling and screening are the critical period for endangered species consideration. Least Bell's vireo nesting and rearing of young takes place in spring and summer. These are also the periods when channel and river flows are lowest; fish may be confined to ponds and pools between dry river sections.

To avoid harming these sensitive species, annual training of field staff that will be performing water sampling and/or non-stormwater outfall screenings is recommended. Fact sheets may also be developed and provided to field staff for review prior monitoring events. The training topics should include the importance of not harming or harassing native wildlife or natural habitats, avoidance of any pools or ponded areas, and safety precautions.

2.4 Sample Collection

All samples will be collected in a manner appropriate for the specific analytical methods to be used. The proper sampling techniques, outlined in this section, will ensure that the collected samples are representative of the water bodies sampled. Should field crews feel that it is unsafe to collect samples for any reason, the field crews **SHOULD NOT COLLECT** sample and note on the field log the sample was not collected, why the sample was not collected, and provide photo documentation, if possible.

2.4.1 Overview of Sampling Techniques

As described below, the method used to collect water samples is dependent on the depth, flow and type of outfall. Nonetheless, in all cases:

1. Throughout each sample collection event, the sampler should exercise aseptic techniques to avoid any contamination (i.e., do not touch the inner surfaces or lip edges of the sample bottle or cap).
2. The sampler should collect a single representative grab sample.
3. The sampler should use clean, powder-free, nitrile gloves for each site to prevent contamination.
4. When collecting the sample, he or she should not breathe in the direction of the container.

5. Gloves should be changed if they are soiled or if the potential for cross-contamination exists from handling sampling materials or samples.
6. While the sample is collected, the bottle lid shall not be placed on the ground.
7. No eating or drinking during sample collection.
8. No smoking.
9. Do not breathe, sneeze, or cough in the direction of an open sample bottle.
10. Each person on the field crew will wear clean clothing that is free of dirt, grease, or other substances that could contaminate the sampling apparatus or sample bottles.
11. To the extent practical, sampling should not occur near a running vehicle. Vehicles should not be parked within the immediate sample collection area, even non-running vehicles.
12. When the sample is collected leave ample air space (about 1 inch) in the bottle to facilitate mixing by shaking for lab analysis, unless otherwise required by the method.
13. After the sample is collected and the cap is tightly screwed back on the bottle, the time of sampling should be recorded on the field tablet or log sheet.
14. Any QA/QC samples that are collected should be also be noted on the field log sheet and labeled according to the convention described in **Section 2.1.2**.
15. Store samples as described previously.
16. Fill out Chain-of-Custody (COC) form as described in **Section 11** and deliver to the appropriate lab within sufficient time for the laboratory to meet the shortest hold time of all the constituents they are analyzing.

To prevent contamination of samples, clean metal sampling techniques using USEPA protocols outlined in USEPA Method 1669[4] will be used throughout all phases of the sampling and laboratory work, including equipment preparation, sample collection, and sample handling, storage, and testing. All containers and test chambers will be acid-rinsed prior to use. Filled sample containers will be kept on ice until receipt at the laboratory.

The protocol for clean metal sampling, based on USEPA Method 1669, is summarized below:

- Samples are collected in rigorously pre-cleaned sample bottles with any tubing specially processed to clean sampling standards.
- At least two persons, wearing clean, powder-free nitrile or latex gloves at all times, are required on a sampling crew.
- One person, referred to as "dirty hands", opens only the outer bag of all double-bagged sample bottles.

[4] USEPA. April 1995. *Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels.* EPA 821-R-95-034.

- The other person, referred to as "clean hands", reaches into the outer bag, opens the inner bag and removes the clean sample bottle.
- Clean hands rinses the bottle at least two times by submerging the bottle, removing the bottle lid, filling the bottle approximately one-third full, replacing the bottle lid, gently shaking and then emptying the bottle. Clean hands then collects the sample by submerging the bottle, removing the lid, filling the bottle and replacing the bottle cap while the bottle is still submerged.
- After the sample is collected, the sample bottle is double-bagged in the opposite order from which it was removed from the same double-bagging.
- Clean, powder-free gloves are changed whenever something not known to be clean has been touched.
- The time of sample collection is recorded on the field log sheet.

2.5 Field Measurements and Observations

Field measurements will be recorded and observations made at each sampling site after a sample is collected. If autosamplers are used, it is not likely feasible to collect measurements and observations at the same time as sample collection. In these instances field measurements may be taken from the composited samples or at the sample site. The field log will note the location and conditions under which measurements are taken. Field measurements will include dissolved oxygen, temperature, conductivity, pH, and flow. Measurements (except for flow) will be collected at approximately mid-stream, mid-depth at the location of greatest flow (if feasible) with a Hydrolab DS4 multi-probe meter, or comparable instrument(s). Field monitoring equipment must meet the requirements outlined in **Table F-7**.

All field measurement results and field observations will be recorded on a field log sheet similar to the one presented in **Appendix 3** and as described in **Section 2.2.1**. Flow measurements will be will be collected as outlined in the following subsections. Regardless of measurement technique used, if a staff gage is present the gage height will be noted.

If at any time the collection of field measurements by wading appears to be unsafe, field crews will not attempt to collect mid-stream, mid-depth measurements. Rather, field measurements will be made by using a telescoping pole and intermediate container to obtain a sample for field measurements and for filling sample containers. Use of sample collection methods other than the mid-stream, mid-depth method will be documented on the field log sheet. Field crews may not be able to measure flow at several sites during wet weather because of inaccessibility of the site. If this is the case, site inaccessibility will be documented on the field log sheet.

The field sampling crew has primary responsibility for responding to failures in the sampling or measurement systems. Deviations from established monitoring protocols will be documented in the comment section of the field log sheet and noted in the post event summaries. If monitoring equipment fails, monitoring personnel will report the problem in the notes section of the field log sheet and will not record data values for the variables in question. Broken equipment will be replaced or repaired prior to the next field use. Data collected using faulty equipment will not be used.

2.5.1 Velocity Meter Flow Measurements

For sampling sites where water is deep enough (>0.1-foot) a velocity meter will be utilized. For these cases, velocity will be measured at approximately equal increments across the width of the flowing water using a Marsh-McBirney Flo-Mate® velocity meter[5], which uses an electromagnetic velocity sensor. A "flow pole" will be used to measure the water depth at each measurement point and to properly align the sensor so that the depth of each velocity measurement is 0.6 * total depth, which is representative of the average velocity. The distance between velocity measurements taken across the stream is dependent on the total width. No more than 10% of the flow will pass through any one cross section.

2.5.2 Shallow Sheet Flow Measurements

If the depth of flow does not allow for the measurement of flow with a velocity meter (<0.1-foot) a "float" will be used to measure the velocity of the flowing water. The width, depth, velocity, cross section, and corresponding flow rate will be estimated as follows:

Sheet flow width: The width (*W*) of the flowing water (not the entire part of the channel that is damp) is measured using a tape measure at the "top", "middle", and "bottom" of a marked-off distance – generally 10 feet (e.g., for a 10-foot marked-off section, W_{Top} is measured at 0-feet, W_{Mid} is measured at 5 feet, and W_{Bottom} is measured at 10 feet).

Sheet flow depth: The depth of the sheet flow is measured at the top, middle, and bottom of the marked-off distance. Specifically, the depth (*D*) of the sheet flow is measured at 25%, 50%, and 75% of the flowing width (e.g., $D_{50\%}^{Mid}$ is the depth of the water at middle of the section in the middle of the sheet flow) at each of the width measurement locations. It is assumed that the depth at the edge of the sheet flow (i.e., at 0% and 100% of the flowing width) is zero.

Representative cross-section: Based on the collected depth and width measurements, the representative cross-sectional area across the marked-off sheet flow is approximated as follows:

[5] For more information, see http://marsh-mcbirney.com/Products/2000.htm

$$Representative\ Cross\ Section =$$

$$Average\ \{[\frac{W_{Top}}{4} \times (\frac{D^{Top}_{25\%}}{2} + \frac{(D^{Top}_{50\%} + D^{Top}_{25\%})}{2} + \frac{(D^{Top}_{75\%} + D^{Top}_{50\%})}{2} + \frac{D^{Top}_{75\%}}{2})],$$
$$[\frac{W_{Mid}}{4} \times (\frac{D^{Mid}_{25\%}}{2} + \frac{(D^{Mid}_{50\%} + D^{Mid}_{25\%})}{2} + \frac{(D^{Mid}_{75\%} + D^{Mid}_{50\%})}{2} + \frac{D^{Mid}_{75\%}}{2})],$$
$$[\frac{W_{Bottom}}{4} \times (\frac{D^{Bottom}_{25\%}}{2} + \frac{(D^{Bottom}_{50\%} + D^{Bottom}_{25\%})}{2} + \frac{(D^{Bottom}_{75\%} + D^{Bottom}_{50\%})}{2} + \frac{D^{Bottom}_{75\%}}{2})]\}$$

Sheet flow velocity: Velocity is calculated based on the amount of time it took a float to travel the marked-off distance (typically 10-feet or more). Floats are normally pieces of leaves, litter, or floatables (suds, etc.). The time it takes the float to travel the marked-off distance is measured at least three times. Then average velocity is calculated as follows:

$$Average\ Surface\ Velocity = \frac{Distance\ Marked\ off\ for\ Float\ Measurement}{Average\ Time\ for\ Float\ to\ Travel\ Marked\ off\ Distance}$$

Flow Rate calculation: For sheet flows, based on the above measurements/estimates, the estimated flow rate, Q, is calculated by:

$$Q = f\ x\ (Representative\ Cross\ Section)\ x\ (Average\ Surface\ Velocity)$$

The coefficient *f* is used to account for friction effects of the channel bottom. That is, the float travels on the water surface, which is the most rapidly-traveling portion of the water column. The average velocity, not the surface velocity, determines the flow rate, and thus *f* is used to “convert” surface velocity to average velocity. In general, the value of *f* typically ranges from 0.60 – 0.90 (USGS 1982). Based on flow rate measurements taken during the LA River Bacteria Source Identification Study (CREST 2008) a value of 0.75 will be used for *f*.

2.5.3 Free-flowing outfalls

Some storm drain outfalls are free-flowing, meaning the runoff falls from an elevated outfall into the channel, which allows for collection of the entire flowing stream of water into a container of known volume (e.g., graduated bucket or graduated Ziploc bag). The time it takes to fill the known volume is measured using a stopwatch, and recorded on the field log. The time it takes to fill the container will be measured three times and averaged to ensure that the calculated discharge is representative. In some cases, a small portion of the runoff may flow around or under the container. For each measurement, “percent capture”, or the proportion of flow estimated to enter the bucket, will be recorded.

For free-flowing outfalls, the estimated flow rate, Q, is calculated by:

$$Q = Average\,[\frac{Filled\ container\ Volume}{(Time\ to\ Fill\ Container) \times (Estimated\ Capture)}]$$

Based on measurements of free-flowing outfalls during the LA River Bacteria Source Identification Study (CREST 2008), estimated capture typically ranges from 0.75 – 1.0.

2.6 Sample Collection Techniques

2.6.1 Direct Submersion: Hand Technique

Where practical, all grab samples will be collected by direct submersion at mid-stream, mid-depth using the following procedures.

1. Wear clean powder-free nitrile gloves when handling containers and lids. Change gloves if soiled or if the potential for cross-contamination occurs from handling sampling materials or samples.
2. Use pre-labeled sample containers as described in the Sample Container Labeling section.
3. Remove the lid, submerge the container to mid-stream/mid-depth, let the container fill and secure the lid.
4. Place the sample on ice.
5. Collect the remaining samples including quality control samples, if required, using the same protocols described above.
6. Fill out the COC form, note sample collection time on the field log sheet, and deliver samples to the appropriate laboratory.

2.6.2 Intermediate Container Technique

Samples may be collected with the use of a specially cleaned intermediate container, if necessary, following the steps listed below. An intermediate container may include a container that is similar in composition such as a pre-cleaned pitcher made of the same material as the sample container, or a Ziploc bag. An intermediate container should not be reused at a different site without appropriate cleaning.

1. Wear clean powder-free nitrile gloves when handling bottles and lids. Change gloves if soiled or if the potential for cross-contamination occurs from handling sampling materials or samples.
2. Use pre-labeled sample containers as described in the Sample Container Labeling section.
3. Submerge the intermediate container to mid-stream/mid-depth (if possible), let the container fill, and quickly transfer the sample into the individual sample container(s) and secure the lid(s).
4. Place the sample(s) on ice.
5. Collect remaining samples including quality control samples, if required, using the same protocols described above.

6. Fill out the COC form, note sample collection time on the field log sheet, and deliver the samples to the appropriate laboratory.

2.6.3 Shallow sheet flows

Some flows may be too shallow to fill the bottle without using an intermediate sterile container. When collecting samples from shallow sheet flows it is very important to <u>not</u> scoop up algae, sediment, or other particulate matter on the bottom of the channel because such debris is not representative of flowing water. To prevent scooping up such debris, either (1) find a spot where the bottom is relatively clean and allow the sterile intermediate container to fill without scooping, or (2) lay a clean sterile Ziploc bag on the bottom and collect the water sample from on top of the bag. A fresh sterile Ziploc bag must be used at each site.

2.6.4 Pumping

The use of a peristaltic pump is not anticipated to be necessary at the CIMP sites; however, information is included here in case pump use becomes necessary due to safety concerns. Samples may be collected with the use of a peristaltic pump and specially cleaned tubing following the steps listed below. Sample tubing should not be reused at a different site without appropriate cleaning.

1. Wear clean powder-free nitrile gloves when handling bottles, lids, and pump tubing. Change gloves if soiled or if the potential for cross-contamination occurs from handling sampling materials or samples.

2. Use pre-labeled sample containers as described in the Sample Container Labeling section.

3. Attach pre-cleaned tubing into the pump, exercising caution to avoid allowing tubing ends to touch any surface known not to be clean. A separate length of clean tubing must be used at each sample location for which the pump is used.

4. Place one end of the tubing below the surface of the water. To the extent possible, avoid placing the tubing near the bottom of the channel so that settled solids are not pumped into the sample container.

5. Hold the other end of the tubing over the opening of the sample container, exercising care not to touch the tubing to the sample container.

6. Pump the necessary sample volume into the sample container and secure the lid;

7. Place the sample on ice;

8. Collect remaining samples including quality control samples, if required, using the same protocols described above; and

9. Fill out the COC form, note sample collection time on the field log sheet, and deliver the samples to appropriate laboratory.

2.6.5 Autosamplers

Automatic sample compositors are used to characterize the entire flow of a storm in one analysis. They can be programmed to take aliquots at either time or flow based specified intervals. To setup and install an automatic compositor it is recommended to read the manufacturer's instructions, before beginning setup in the field. The general steps to setup the sampler are described below.

1. Connect power source to automatic sampling computer. This can be in the form of a battery or a power cable.

2. Install pre-cleaned tubing into the pump. To the extent practicable, clean tubing will be used at each site and for each event, in order to minimize contamination. For some stations, it may be more practical to replace tubing on an annual or every other year basis. In those instances, it would be appropriate to collect equipment blanks prior to sampling events. Tubing that is not newly installed should be flushed with clean water prior to each sampling event.

3. Attach strainer to intake end of the Teflon tubing and install in sampling channel.

4. If running flow based composite samples; install flow sensor in sampling channel and connect it to the automatic compositor.

5. Label and install composite bottle(s). If sampler is not refrigerated, then add enough ice to the composite bottle chamber to keep sample cold for the duration of sampling or until such time as ice can be refreshed. Make sure not to contaminate the inside of the composite bottle with any of the ice.

6. Program the sampler as to the manufacturer's instructions and make sure sampler is powered and running before leaving the site.

After the sample collection is completed the following steps must be taken to ensure proper sample handling.

1. Upon returning to the site, check the status of the sampler and record any errors or missed samples. Note on the field log the time of the last sample, as this will be used for filling out the COCs.

2. Remove composite bottle and store on ice at <4ºC. If dissolved metals are required then begin the sample filtration process outlined in **Section 2.6.6** within 15 minutes of the last composite sample, unless compositing must occur at another location, in which case the filtration process should occur as soon as possible upon sample compositing.

3. Power down automatic compositor and leave sampling site.

4. The composite sample will need to be split into the separate analysis bottles before being shipped to the laboratory. This is best done in a clean and weatherproof environment, using clean sampling techniques.

Site specific autosampler SOPs will be developed after installation of the autosampler and prior to the first sample collection. Subsequent versions of the CIMP will be updated to include the SOPs.

2.6.6 Dissolved Metals Field Filtration

When feasible, samples for dissolved metals will be filtered in the field. The following describes an appropriate dissolved field filtration method. An alternative or equivalent method may be utilized if necessary. A 50mL plastic syringe with a 0.45µm filter attached will be used to collect and filter the dissolved metals sample in the field. The apparatus will either come certified pre-cleaned from the manufacturer and confirmed by the analytical laboratory or be pre-cleaned by and confirmed by the analytical laboratory at least once per year. The apparatus will be double bagged in zip-lock plastic bags.

To collect the sample for dissolved metals, first collect the total metals sample using clean sampling techniques. The dissolved sample will be taken from this container. Immediately prior to collecting the dissolved sample, shake the total metals sample. To collect the dissolved metals sample using clean sampling techniques, remove the syringe from the bag and place the tip of the syringe into the bottle containing the total metals sample and draw up 50 mL of sample into the syringe. Next, remove the filter from the zip-lock bag and screw it tightly into the tip of the syringe. Then put the tip of the syringe with the filter into the clean dissolved metals container and push the sample through the filter taking care not to touch the inside surface of the sample container with the apparatus. The sample volume needs to be a minimum of 20 mL. If the filter becomes clogged prior to generating 20 mL of sample, remove and dispose of the used filter and replace it with a new clean filter. Continue to filter the sample. When 20 mL has been collected, cap the sample bottle tightly and store on ice for delivery to the laboratory.

2.7 Receiving Water Sample Collection

A grab sample is a discrete individual sample. A composite sample is mixture of grab samples collected over a period of time either as time or flow weighted. A time weighted composite is created by mixing multiple aliquots collected at specified time intervals. A flow-weighted composite is created by mixing multiple aliquots collected at equal intervals but then mixed based on flow rate. Should field crews feel that it is unsafe to collect samples for any reason, the field crews **SHOULD NOT COLLECT** samples and note on the field log the sample was not collected, why the sample was not collected, and provide photo documentation, if feasible.

Grab samples will be used for dry and wet weather sampling events at all sites except SNTCLR_6_ME. Grab samples will be collected as described in **Section 2.6** Monitoring site configuration and consideration of safety will dictate grab sample collection technique.

The potential exists for monitoring sites to lack discernable flow. The lack of discernable flow may generate unrepresentative data. To address the potential confounding interference that can occur under such conditions, sites sampled should be assessed for the following conditions and sampled or not sampled accordingly:

- Pools of water with no flow or visible connection to another surface water body should not be sampled. The field log should be completed for non-water quality data (including date and time of visit) and the site condition should be photo-documented.

- Flowing water (*i.e.*, based on visual observations, flow measurements, and a photo-documented assessment of conditions immediately upstream and downstream of the sampling site) site should be sampled.

It is the combined responsibility of all members of the sampling crew to determine if the performance requirements of the specific sampling method have been met, and to collect additional samples if required. If the performance requirements outlined above or documented in sampling protocols are not met, the sample will be re-collected. If contamination of the sample container is suspected, a fresh sample container will be used. The Project Manager will be contacted if at any time the sampling crew has questions about procedures or issues based on site-specific conditions.

2.8 Stormwater Outfall Sample Collection

Stormwater outfalls will be monitored with similar methods as discussed in the receiving water sampling section. Sampling will not be undertaken if the outfalls are not flowing or if conditions exist where the receiving water is back-flowing into the outfall. It is the combined responsibility of all members of the sampling crew to determine if the performance requirements of the specific sampling method have been met, and to collect additional samples if required. If the performance requirements outlined above or documented in sampling protocols are not met, the sample will be re-collected. If contamination of the sample container is suspected, a fresh sample container will be used. The Project Manager will be contacted if at any time the sampling crew has questions about procedures or issues based on site-specific conditions.

2.9 Non-Stormwater Outfall Sample Collection and Screening Surveys

Non-stormwater outfall water quality samples will be collected consistent with the grab sample techniques previously described, using direct submersion, intermediate container, shallow sheet flow, or pumping methods. The non-stormwater outfall screening process is designed to identify outfalls that discharge significant non-stormwater flow.

2.9.1 Preparation for Outfall Sampling

Preparation for outfall sampling includes preparation of field equipment, placing bottle orders, and contacting the necessary personnel regarding site access and schedule. The following steps should be completed two weeks prior to each outfall survey:

1. Check weather reports and LACDPW rain gages to ensure that antecedent dry weather conditions are suitable.
2. Contact appropriate Flood Maintenance Division personnel from Los Angeles County Flood Control District to notify them of dates and times of any activities in flood control channels.
3. Contact laboratories to order bottles and to coordinate sample pick-ups.
4. Confirm scheduled sampling date with field crews.
5. Set-up sampling day itinerary including sample drop-offs and pick-ups.
6. Compile field equipment.
7. Prepare sample labels.
8. Prepare event summaries to indicate the type of field measurements, field observations and samples to be taken at each of the stations.
9. Prepare COCs.
10. Charge the batteries of field tablets (if used).

2.9.2 Preparation for Outfall Surveys

Preparation for outfall surveys includes preparation of field equipment and contacting the necessary personnel regarding site access and schedule. The following steps should be completed two weeks prior to each outfall survey:

1. Check weather reports and LACDPW rain gages to ensure that antecedent dry weather conditions are suitable.
2. Contact appropriate Flood Maintenance Division personnel from Los Angeles County Flood Control District to notify them of dates and times of any activities in flood control channels.
3. Confirm scheduled survey date with field crews.
4. Set-up survey day itinerary.
5. Compile field equipment.
6. Prepare event summaries to indicate the type of field measurements and field observations to be taken at each of the stations.
7. Charge the batteries of field tablets (if used).

2.10 Quality Control Sample Collection

Quality control samples will be collected in conjunction with environmental samples to verify data quality. Quality control samples collected in the field include field blanks and duplicates. The frequency of quality control sample collection is presented **Section 3**.

3 QUALITY ASSURANCE/QUALITY CONTROL

This section describes the quality assurance and quality control requirements and processes. There are no Surface Water Ambient Monitoring Program (SWAMP) requirements for quality control for field analysis of general parameters (*e.g.*, temperature, pH, conductivity, dissolved oxygen, and pH). However, field crews will be required to calibrate equipment as outlined in **Section 2.1.3**. **Table F-11** presents the QA parameter addressed by each QA requirement as well as the appropriate corrective action if the acceptance limit is exceeded.

Table F-11. Quality Control Requirement

Quality Control Sample Type	QA Parameter	Frequency[1]	Acceptance Limits	Corrective Action
Quality Control Requirements – Field				
Equipment Blanks	Contamination	5% of all samples [2]	< MDL	Identify equipment contamination source. Qualify data as needed.
Field Blank	Contamination	5% of all samples	< MDL	Examine field log. Identify contamination source. Qualify data as needed.
Field Duplicate	Precision	5% of all samples	RPD ≤ 25% if |Difference| ≥ RL	Reanalyze both samples if possible. Identify variability source. Qualify data as needed.
Quality Control Requirements – Laboratory				
Method Blank	Contamination	1 per analytical batch	< MDL	Identify contamination source. Reanalyze method blank and all samples in batch. Qualify data as needed.
Lab Duplicate	Precision	1 per analytical batch	RPD ≤ 25% if |Difference| ≥ RL	Recalibrate and reanalyze.
Matrix Spike	Accuracy	1 per analytical batch	80-120% Recovery for GWQC 75-125% for Metals 50-150% Recovery for Pesticides [3]	Check LCS/SRM recovery. Attempt to correct matrix problem and reanalyze samples. Qualify data as needed.
Matrix Spike Duplicate	Precision	1 per analytical batch	RPD ≤ 30% if |Difference| ≥ RL	Check lab duplicate RPD. Attempt to correct matrix problem and reanalyze samples. Qualify data as needed.
Laboratory Control Sample (or CRM or Blank Spike)	Accuracy	1 per analytical batch	80-120% Recovery for GWQC 75-125% for Metals 50-150% Recovery for Pesticides [3]	Recalibrate and reanalyze LCS/ SRM and samples.
Blank Spike Duplicate	Precision	1 per analytical batch	RPD ≤ 25% if |Difference| ≥ RL	Check lab duplicate RPD. Attempt to correct matrix problem and reanalyze samples. Qualify data as needed.
Surrogate Spike (Organics Only)	Accuracy	Each environmental and lab QC sample	30-150% Recovery[3]	Check surrogate recovery in LCS. Attempt to correct matrix problem and reanalyze sample. Qualify data as needed.

MDL = Method Detection Limit   RL = Reporting Limit   RPD = Relative Percent Difference
LCS = Laboratory Control Sample/Standard   CRM = Certified/ Standard Reference Material
GWQC = General Water Quality Constituents   ENV. = Environmental Sample

1. "Analytical batch" refers to a number of samples (not to exceed 20 environmental samples plus the associated quality control samples) that are similar in matrix type and processed/prepared together under the same conditions and same reagents (equivalent to preparation batch).
2. Equipment blanks will be collected by the field crew before using the equipment to collect sample.
3. Or control limits set at $\pm$ 3 standard deviations based on actual laboratory data.

3.1 QA/QC Requirements and Objectives

3.1.1 Comparability

Comparability of the data can be defined as the similarity of data generated by different monitoring programs. For this monitoring program, this objective will be ensured mainly through use of standardized procedures for field measurements, sample collection, sample preparation, laboratory analysis, and site selection; adherence to quality assurance protocols and holding times; and reporting in standard units. Additionally, comparability of analytical data will be addressed through the use of standard operating procedures and extensive analyst training at the analyzing laboratory.

3.1.2 Representativeness

Representativeness can be defined as the degree to which the environmental data generated by the monitoring program accurately and precisely represent actual environmental conditions. For the CIMP, this objective will be addressed by the overall design of the program. Representativeness is attained through the selection of sampling locations, methods, and frequencies for each parameter of interest, and by maintaining the integrity of each sample after collection. Sampling locations were chosen that are representative of various areas within the watershed and discharges from urban and agricultural lands, which will allow for the characterization of the watershed and impacts discharges may have on water quality.

3.1.3 Completeness

Data completeness is a measure of the amount of successfully collected and validated data relative to the amount of data planned to be collected for the project. It is usually expressed as a percentage value. A project objective for percent completeness is typically based on the percentage of the data needed for the program or study to reach valid conclusions.

Because the CIMP is intended to be a long term monitoring program, data that are not successfully collected during a specific sample event will not be recollected at a later date. Rather subsequent events conducted over the course of the monitoring will provide robust data sets to appropriately characterize conditions at individual sampling sites and the watershed in general.

However, some reasonable objectives for data are desirable, if only to measure the effectiveness of the program when conditions allow for the collection of samples (*i.e.*, flow is present). The program goals for data completeness shown in **Table F–3** are based on the planned sampling frequency, SWAMP recommendations, and a subjective determination of the relative importance of the monitoring element within the CIMP. If, however, sampling sites do not allow for the collection of enough samples to provide representative data due to conditions, alternate sites will be considered. Data completeness will be evaluated on a yearly basis.

3.2 QA/QC Field Procedures

For basic water quality analyses, quality control samples to be prepared in the field will consist of equipment blanks, field blanks and field duplicates as described below.

3.2.1 Equipment Blanks

The purpose of analyzing equipment blanks is to demonstrate that sampling equipment is free from contamination. Equipment blanks will be prepared by the analytical laboratory responsible for cleaning equipment and analyzed for pesticides, PCBs, and metals before sending the equipment to the field crew. Equipment blanks will consist of laboratory-prepared blank water (certified to be contaminant-free by the laboratory) processed through the sampling equipment that will be used to collect environmental samples.

The blanks will be analyzed using the same analytical methods specified for environmental samples. If any analytes of interest are detected at levels greater than the MDL, the source(s) of contamination will be identified and eliminated (if possible), the affected batch of equipment will be re-cleaned, and new equipment blanks will be prepared and analyzed before the equipment is returned to the field crew for use.

3.2.2 Field Blanks

The purpose of analyzing field blanks is to demonstrate that sampling procedures do not result in contamination of the environmental samples. Per the Quality Assurance Management Plan for the State of California's Surface Water Ambient Monitoring Program (SWRCB, 2008) field blanks are to be collected as follows:

- At a frequency of 5% of samples collected for the following constituents: trace metals in water (including mercury) and VOA samples in water, and bacteria samples. At a minimum, one bacteria field blank should be collected per sampling event, even if this leads to a percentage of field blanks greater than 5%.
- Field blanks for other media and analytes should be conducted upon initiation of sampling, and if field blank performance is acceptable (as described in **Table F-11**), further collection and analysis of field blanks for these other media and analytes need only be performed on an as-needed basis, or during field performance audits. An as-needed basis for the SCR CIMP will be annually.

Blanks will consist of laboratory-prepared blank water (certified to be contaminant-free by the laboratory) processed through the sampling equipment using the same procedures used for environmental samples.

If any analytes of interest are detected at levels greater than the MDL, the source(s) of contamination should be identified and eliminated, if possible. The sampling crew should be notified so that the source of contamination can be identified (if possible) and corrective measures taken prior to the next sampling event.

3.2.3 Field Duplicates

The purpose of analyzing field duplicates is to demonstrate the precision of sampling and analytical processes. Field duplicates will be prepared at the rate of 5% of all samples, and analyzed along with the associated environmental samples. Field duplicates will consist of two grab samples collected simultaneously, to the extent practicable. If the Relative Percent Difference (RPD) of field duplicate results is greater than the percentage stated in **Table F-11** and the absolute difference is greater than the RL, both samples should be reanalyzed, if possible. The sampling crew should be notified so that the source of sampling variability can be identified (if possible) and corrective measures taken prior to the next sampling event.

3.3 QA/QC Laboratory Analyses

Quality control samples prepared in the laboratory will consist of method blanks, laboratory duplicates, matrix spikes/duplicates, laboratory control samples (standard reference materials), and toxicity quality controls.

3.3.1 Method Blanks

The purpose of analyzing method blanks is to demonstrate that sample preparation and analytical procedures do not result in sample contamination. Method blanks will be prepared and analyzed by the contract laboratory at a rate of at least one for each analytical batch. Method blanks will consist of laboratory-prepared blank water processed along with the batch of environmental samples. If the result for a single method blank is greater than the MDL, or if the average blank concentration plus two standard deviations of three or more blanks is greater than the RL, the source(s) of contamination should be corrected, and the associated samples should be reanalyzed.

3.3.2 Laboratory Duplicates

The purpose of analyzing laboratory duplicates is to demonstrate the precision of the sample preparation and analytical methods. Laboratory duplicates will be analyzed at the rate of one pair per sample batch. Laboratory duplicates will consist of duplicate laboratory fortified method blanks. If the Relative Percent Difference (RPD) for any analyte is greater than the percentage stated in **Table F-11** and the absolute difference between duplicates is greater than the RL, the analytical process is not being performed adequately for that analyte. In this case, the sample batch should be prepared again, and laboratory duplicates should be reanalyzed.

3.3.3 Matrix Spikes and Matrix Spike Duplicates

The purpose of analyzing matrix spikes and matrix spike duplicates is to demonstrate the performance of the sample preparation and analytical methods in a particular sample matrix. Matrix spikes and matrix spike duplicates will be analyzed at the rate of one pair per sample batch. Each matrix spike and matrix spike duplicate will consist of an aliquot of laboratory-fortified environmental sample. Spike concentrations should be added at five to ten times the reporting limit for the analyte of interest.

If the matrix spike recovery of any analyte is outside the acceptable range, the results for that analyte have failed to meet acceptance criteria. If recovery of laboratory control samples is acceptable, the analytical process is being performed adequately for that analyte, and the problem is attributable to the sample matrix. An attempt will be made to correct the problem (*e.g.*, by dilution, concentration, etc.), and the samples and matrix spikes will be re-analyzed.

If the matrix spike duplicate RPD for any analyte is outside the acceptable range, the results for that analyte have failed to meet acceptance criteria. If the RPD for laboratory duplicates is acceptable, the analytical process is being performed adequately for that analyte, and the problem is attributable to the sample matrix. An attempt will be made to correct the problem (*e.g.*, by dilution, concentration, etc.), and the samples and matrix spikes will be re-analyzed.

3.3.4 Laboratory Control Samples

The purpose of analyzing laboratory control samples (or a standard reference material) is to demonstrate the accuracy of the sample preparation and analytical methods. Laboratory control samples will be analyzed at the rate of one per sample batch. Laboratory control samples will consist of laboratory fortified method blanks or a standard reference material. If recovery of any analyte is outside the acceptable range, the analytical process is not being performed adequately for that analyte. In this case, the sample batch should be prepared again, and the laboratory control sample should be reanalyzed.

3.3.5 Surrogate Spikes

Surrogate recovery results are used to evaluate the accuracy of analytical measurements for organics analyses on a sample-specific basis. A surrogate is a compound (or compounds) added by the laboratory to method blanks, samples, matrix spikes, and matrix spike duplicates prior to sample preparation, as specified in the analytical methodology. Surrogates are generally brominated, fluorinated or isotopically labeled compounds that are not usually present in environmental media. Results are expressed as percent recovery of the surrogate spike. Surrogate spikes are applicable for analysis of PCBs and pesticides.

3.3.6 Toxicity Quality Control

For aquatic toxicity tests, the acceptability of test results is determined primarily by performance-based criteria for test organisms, culture and test conditions, and the results of control bioassays. Control bioassays include monthly reference toxicant testing. Test acceptability requirements are documented in the method documents for each bioassay method.

4 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Frequencies and procedures for calibration of analytical equipment used by each contract laboratory are documented in the QA Manual for each contract laboratory. Any deficiencies in analytical equipment calibration should be managed in accordance with the QA Manual for each contract laboratory. Any deficiencies that affect analysis of samples submitted through this program must be reported to the Project Manager, or designee. Laboratory QA Manuals are available for review at the analyzing laboratory.

5 DATA MANAGEMENT, VALIDATION AND USABILITY

The Monitoring Manager will maintain an inventory of data and its forms. After each sampling event, data collected in the USCRWMG CIMP will be verified and validated before it is deemed ready for reporting. This section describes the process that the Monitoring Manager will take to verify and validate the collected data.

5.1 Data Review, Verification, and Validation Requirements

The acceptability of data is determined through data verification and data validation. Both processes are discussed in detail below. In addition to the data quality objectives presented in **Table F-11,** the standard data validation procedures documented in the contract laboratory's QA Manual will be used to accept, reject, or qualify the data generated by the laboratory. Each laboratory's QA Officer will be responsible for validating data generated by the laboratory.

Once analytical results are received from the analyzing laboratory, the Project QA Officer will perform an independent review and validation of analytical results. **Appendix 4** provides equations that are used to calculate precision, accuracy, and completeness of the data. Decisions to reject or qualify data will be made by the Project QA Manager, or designee, based on the evaluation of field and laboratory quality control data, according to procedures outlined in Section 13 of Caltrans document No. CTSW-RT-00-005, *Guidance Manual: Stormwater Monitoring Protocols*, 2nd Edition (LWA, July 2000). Section 13 of the Caltrans Guidance Manual is included as **Appendix 5**.

5.2 Data Verification

Data verification involves verifying that required methods and procedures have been followed at all stages of the data collection process, including sample collection, sample receipt, sample preparation, sample analysis, and documentation review for completeness. Verified data have been checked for a variety of factors, including transcription errors, correct application of dilution factors, appropriate reporting of dry weight versus wet weight results, and correct application of conversion factors. Verification of data may also include laboratory qualifiers, if assigned.

Data verification should occur in the field and the laboratory at each level (*i.e*., all personnel should verify their own work) and as information is passed from one level to the next (*i.e*., supervisors should verify the information produced by their staff). Records commonly examined during the verification process include field and sample collection logs, chain-of-custody forms, sample preparation logs, instrument logs, raw data, and calculation worksheets.

In addition, laboratory personnel will verify that the measurement process was "in control" (*i.e*., all specified data quality objectives were met or acceptable deviations explained) for each batch of samples before proceeding with the analysis of a subsequent batch. Each laboratory will also establish a system for detecting and reducing transcription and/or calculation errors prior to reporting data.

5.3 Data Validation

In general, data validation involves identifying project requirements, obtaining the documents and records produced during data verification, evaluating the quality of the data generated, and determining whether project requirements were met. The main focus of data validation is determining data quality in terms of accomplishment of measurement quality objectives (*i.e.*, meeting QC acceptance criteria). Data quality indicators, such as precision, accuracy, sensitivity, representativeness, and completeness, are typically used as expressions of data quality. The Project QA Manager, or designee, will review verified sample results for the data set as a whole, including laboratory qualifiers, summarize data and QC deficiencies and evaluate the impact on overall data quality, assign data validation qualifiers as necessary, and prepare an analytical data validation report. The validation process applies to both field and laboratory data.

In addition to the data quality objectives presented in **Table F-11,** the standard data validation procedures documented in the analyzing laboratory's QA Manual will be used to accept, reject or qualify the data generated. The laboratory will submit only data that have met data quality objectives, or data that have acceptable deviations explained. When QC requirements have not been met, the samples will be reanalyzed when possible, and only the results of the reanalysis will be submitted, provided that they are acceptable. Each laboratory's QA Officer is responsible for validating the data it generates.

5.4 Data Management

Event Summary Reports and Analytical Data Reports will be sent to and kept by the Project Manager. Each type of report will be stored separately and ordered chronologically. The field crew shall retain the original field logs. The contract laboratory shall retain original COC forms. The contract laboratory will retain copies of the preliminary and final data reports. Concentrations of all parameters will be calculated as described in the laboratory SOPs or referenced method document for each analyte or parameter.

The field log and analytical data generated will be converted to a standard database format maintained on personal computers. After data entry or data transfer procedures are completed for each sample event, data will be validated according to the acceptance criteria described Appendix 3. After the final quality assurance checks for errors are completed, the data will be added to the final database.

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Appendix 1: Example Field, Calibration, and Chain-of-Custody Forms

EXAMPLE Field Log

GENERAL INFORMATION

Date: __________

Site ID: ________________________________ Sampling Personnel: ________________________

GPS Coordinates: (lat) ____________________ (lon) ________________________ Picture/Video #: __________

OBSERVATIONS

Weather:____

Water Color:____________________________ In stream Activity:______________________________

Water Characteristics (flow type, odor, turbidity, floatables):___________________________________

Other comments (trash, wildlife, recreational uses, homeless activity, etc. – Use notes section if more room is needed):

____

***In situ* WATER QUALITY MEASUREMENTS**

Time	Temp (^{0}C)	pH	D.O. (mg/L)	D.O. % Sat	Elec Cond. (uS/cm)

COLLECTED WATER QUALITY SAMPLES

Sample ID	Analysis	Time	Volume	Notes
				Field blank
				Field duplicate

ADDITIONAL WATER QUALITY SAMPLING NOTES:

FLOW MEASUREMENTS WITH VELOCITY METER

Estimated Total Width of Flowing Water (ft): ____________ Distance measured from (circle): RIGHT or LEFT

Measurement Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Distance from Bank (ft)														
Depth (ft)														
Velocity (ft/s)														

FLOW MEASUREMENTS WITH FLOAT AND STOPWATCH Number of Flow Paths:______

Fill out Path # ➔	Path#	Path#	Path#	Path#	Path#
Width of Flow at **Top** of Marked Section:					
Width of Flow at **Middle** of Marked Section:					
Width of Flow at **Bottom** of Marked Section:					
Depth of Flow at 0% of **Top** Marked Section:					
Depth of Flow at 25% of **Top** Marked Section:					
Depth of Flow at 50% of **Top** Marked Section:					
Depth of Flow at 75% of **Top** Marked Section:					
Depth of Flow at 100% of **Top** Marked Section:					
Depth of Flow at 0% of **Middle** Marked Section:					
Depth of Flow at 25% of **Middle** Marked Section:					
Depth of Flow at 50% of **Middle** Marked Section:					
Depth of Flow at 75% of **Middle** Marked Section:					
Depth of Flow at 100% of **Middle** Marked Section:					
Depth of Flow at 0% of **Bottom** Marked Section					
Depth of Flow at 25% of **Bottom** Marked Section:					
Depth of Flow at 50% of **Bottom** Marked Section:					
Depth of Flow at 75% of **Bottom** Marked Section:					
Depth of Flow at 100% of **Bottom** Marked Section					
Distance Marked-off for Velocity:					
Time 1:					
Time 2:					
Time 3:					

Specify if measurements are in inches or feet using "in" or "ft"

FLOW MEASUREMENT WITH GRADUATED CONTAINER

Container Volume:_______________ Percent Capture:_________________

Time to fill container:

	Minutes	Seconds
Time1		
Time2		
Time3		

ADDITIONAL FLOW MEASUREMENT NOTES:

EXAMPLE Field Meter Calibration Logsheet

Field Measurement Equipment Calibration Log & Initial Calibration Verification

Date:

Parameter	Meter ID	Calibration Standard	Post-Cal Measurement	Calibration Valid if:	Time	Initials
Dissolved Oxygen		______ mmHG _______ °C ________mg/L [1]	__________ mg/L (water-sat'd air)	D.O. reads within 10% of value from D.O. tables [1]		
Conductivity		0 uS/cm (air)				
		10,000 uS/cm	___________uS/cm (1,000 uS/cm)	900 – 1,100 uS/cm		
pH		7.0 Units				
		10.0 Units	___________Units (pH = 8.0)	pH 8 = 7.8 - 8.2 (or w/in manuf's specs)		
		3000 NTU	__________NTU (1000 NTU)	NTU = 900 - 110		

Notes:

Field Measurement Equipment Post Event Calibration Verification Log

Date:

Parameter	Meter ID	Verification Standard	Measurement	Calibration Valid if:	Time	Initials
Dissolved Oxygen		______ mmHG _______ °C ________mg/L [1]	__________ mg/L (water-sat'd air)	D.O. reads within 10% of value from D.O. tables [1]		
Conductivity		______ uS/cm	___________uS/cm (1,000 uS/cm)	EC of 1,000 std = 900 – 1,100 uS/cm		
pH		________Units	___________Units (pH = 8.0)	pH 8.0 = 7.8 - 8.2 (or w/in manuf's specs)		

Notes:

[1] "D.O. tables" refers to tables of dissolved oxygen in water as a function of temperature and barometric pressure, typically found in wastewater engineering text books.

CHAIN-OF-CUSTODY RECORD

Date:

Lab ID:

Destination Lab:

Address:

Phone:

Fax:

Sampled By:

Contact:

Project:

Client Sample Id	Sample Date	Sample Time	Sample Matrix	Container #	Container Type	Container Pres.											Notes

Sender Comments:	Relinquished By (1): Signature: Print: Organization: Date: Time:	Relinquished By (2): Date: Time:
Laboratory Comments:	Received By (1): Signature: Print: Organization: Date: Time:	Received By (2): Date: Time:

Crew:

Appendix 2: Calculations for Data Quality Assessment

This appendix documents the calculations used to assess precision, accuracy, and completeness of the data.

Precision

Precision is a measure of the degree to which replicate measurements differ from one another. Precision assessed through calculation of field and laboratory duplicates, and matrix spike duplicates is expressed as the Relative Percent Difference (RPD).
RPD for laboratory and field duplicates is calculated as follows:

$$\text{RPD} = 100 \text{ x} \left(\frac{|\text{replicate 1 - replicate 2}|}{(\text{replicate 1} + \text{replicate 2}) \div 2} \right)$$

RPD for matrix spike duplicates is calculated as follows:

$$\text{RPD} = 100 \text{ x} \left(\frac{|\text{recovery 1 - recovery 2}|}{(\text{recovery 1} + \text{recovery 2}) \div 2} \right)$$

where *Recovery* is calculated as described for matrix spikes, below.

If assessed with three or more replicate measurements, precision should be expressed as Relative Standard Deviation (RSD). RSD is calculated as:

$$\text{RSD} = 100 \text{ x} \left(\frac{\text{standard deviation of replicated measurements}}{\text{average of replicate measurements}} \right)$$

Accuracy

Accuracy is the degree to which a measured value agrees with a true or expected value for a parameter. Accuracy is typically assessed using standard reference materials, laboratory control samples, and matrix spikes. Recovery of laboratory control samples and standard reference materials is calculated as:

$$\%\ \text{Recovery} = 100 \text{ x} \left(\frac{\text{recovered concentration}}{\text{true spike concentration}} \right)$$

Recovery of matrix spikes is calculated as:

$$\%\ \text{Recovery} = 100 \text{ x} \left(\frac{\text{total recovered concentration - sample concentration}}{\text{true spike concentration}} \right)$$

When sample concentrations are less than the method detection limit, a value of "0" (zero) will be used as the sample result concentration for purposes of calculating spike recoveries.

Completeness

Completeness may be defined as the number of valid measurements compared to the total number of measurements collected. Completeness is calculated as:

$$\%\ \text{Completeness} = 100 \text{ x } \left(\frac{\text{number of valid measurements}}{\text{total number of measurements}} \right)$$

Appendix 3: Chapter 13 QA/QC Data Evaluation from Caltrans Guidance Manual: Stormwater Monitoring Protocols, 2nd Edition

SECTION 13
QA/QC DATA EVALUATION

All data reported by the analytical laboratory must be carefully reviewed to determine whether the project's data quality acceptability limits or objectives (DQOs) have been met. This section describes a process for evaluation of all laboratory data, including the results of all QA/QC sample analysis.

Before any results are reported by the laboratory, the deliverable requirements should be clearly communicated to the laboratory, as described in the "Laboratory Data Package Deliverables" discussion in ***Section 12***.

The current section discusses QA/QC data evaluation in the following two parts:

KEY TOPICS

- ➢ **Initial Data Quality Screening**
- ➢ **Data Quality Evaluation**

The initial data quality screening identifies problems with laboratory reporting while they may still be corrected. When the data reports are received, they should be immediately checked for conformity to chain of custody requests to ensure that all requested analyses have been reported. The data are then evaluated for conformity to holding time requirements, conformity to reporting limit requests, analytical precision, analytical accuracy, and possible contamination during sampling and analysis. The data evaluation results in rejection, qualification, and narrative discussion of data points or the data as a whole. Qualification of data, other than rejection, does not necessary exclude use of the data for all applications. It is the decision of the data user, based on specifics of the data application, whether or not to include qualified data points.

➢ INITIAL DATA QUALITY SCREENING

The initial screening process identifies and corrects, when possible, inadvertent documentation or process errors introduced by the field crew or the laboratory. The initial data quality control screening should be applied using the following three-step process:

1. *Verification check between sampling and analysis plan (SAP), chain of custody forms, and laboratory data reports*: Chain of custody records should be compared with field logbooks and laboratory data reports to verify the accuracy of all sample identification and to ensure that all samples submitted for analysis have a value reported for each parameter requested. Any deviation from the SAP that has not yet

been documented in the field notes or project records should be recorded and corrected if possible.

Sample representativeness should also be assessed in this step. The minimum acceptable storm capture parameters (number of aliquots and percent storm capture) per amount of rainfall are specified in ***Section 10***. Samples not meeting these criteria are generally not analyzed; however, selected analyses can be run at the Caltrans task manager's discretion. If samples not meeting the minimum sample representativeness criteria are analyzed, the resulting data should be rejected ("R") or qualified as estimated ("J"), depending upon whether the analyses were approved by Caltrans. Grab samples should be taken according to the timing protocols specified in the SAP. Deviations from the protocols will result in the rejection of the data for these samples or qualification of the data as estimated. The decision to reject a sample based on sample representativeness should be made prior to the submission of the sample to the laboratory, to avoid unnecessary analytical costs.

2. *Check of laboratory data report completeness*: As discussed in ***Section 12***, the end product of the laboratory analysis is a data report that should include a number of QA/QC results along with the environmental results. QA/QC sample results reported by the lab should include both analyses requested by the field crew (field blanks, field duplicates, lab duplicates and MS/MSD analysis), as well as internal laboratory QA/QC results (method blanks and laboratory control samples).

There are often differences among laboratories in terms of style and format of reporting. Therefore, it is prudent to request in advance that the laboratory conform to the style and format approved by Caltrans as shown in ***Section 14***. The Caltrans data reviewer should verify that the laboratory data package includes the following items:

- ✓ A narrative which outlines any problems, corrections, anomalies, and conclusions.
- ✓ Sample identification numbers.
- ✓ Sample extraction and analysis dates.
- ✓ Reporting limits for all analyses reported.
- ✓ Results of method blanks.
- ✓ Results of matrix spike and matrix spike duplicate analyses, including calculation of percent recovered and relative percent differences.
- ✓ Results of laboratory control sample analyses.
- ✓ Results of external reference standard analyses.
- ✓ Surrogate spike and blank spike analysis results for organic constituents.

✓ A summary of acceptable QA/QC criteria (RPD, spike recovery) used by the laboratory.

Items missing from this list should be requested from the laboratory.

3. *Check for typographical errors and apparent incongruities*: The laboratory reports should be reviewed to identify results that are outside the range of normally observed values. Any type of suspect result or apparent typographical error should be verified with the laboratory. An example of a unique value would be if a dissolved iron concentration has been reported lower than 500 μg/L for every storm event monitored at one location and then a value of 2500 μg/L is reported in a later event. This reported concentration of 2500 μg/L should be verified with the laboratory for correctness.

   Besides apparent out-of-range values, the indicators of potential laboratory reporting problems include:

   - Significant lack of agreement between analytical results reported for laboratory duplicates or field duplicates.
   - Consistent reporting of dissolved metals results higher than total or total recoverable metals.
   - Unusual numbers of detected values reported for blank sample analyses.
   - Inconsistency in sample identification/labeling.

   If the laboratory confirms a problem with the reported concentration, the corrected or recalculated result should be issued in an amended report, or if necessary the sample should be re-analyzed. If laboratory results are changed or other corrections are made by the laboratory, an amended laboratory report should be issued to update the project records.

➢ DATA QUALITY EVALUATION

The data quality evaluation process is structured to provide systematic checks to ensure that the reported data accurately represent the concentrations of constituents actually present in stormwater. Data evaluation can often identify sources of contamination in the sampling and analytical processes, as well as detect deficiencies in the laboratory analyses or errors in data reporting. Data quality evaluation allows monitoring data to be used in the proper context with the appropriate level of confidence.

QA/QC parameters that should be reviewed are classified into the following categories:

✔ Reporting limits

- ✔ Holding times
- ✔ Contamination check results (method, field, trip, and equipment blanks)
- ✔ Precision analysis results (laboratory, field, and matrix spike duplicates)
- ✔ Accuracy analysis results (matrix spikes, surrogate spikes, laboratory control samples, and external reference standards)

Each of these QA/QC parameters should be compared to data quality acceptability criteria, inalso known as the project's data quality objectives (DQOs). The key steps that should be adhered to in the analysis of each of these QA/QC parameters are:

1. Compile a complete set of the QA/QC results for the parameter being analyzed.
2. Compare the laboratory QA/QC results to accepted criteria (DQOs).
3. Compile any out-of-range values and report them to the laboratory for verification.
4. Prepare a report that tabulates the success rate for each QA/QC parameter analyzed.

This process should be applied to each of the QA/QC parameters as discussed below.

Reporting Limits

Stormwater quality monitoring program DQOs should contain a list of acceptable reporting limits that the lab is contractually obligated to adhere to, except in special cases of insufficient sample volume or matrix interference problems. The reporting limits used should ensure a high probability of detection. , Table 12-1 provides recommended reporting limits for selected parameters.

Holding Times

Holding time represents the elapsed time between sample collection time and sample analysis time. Calculate the elapsed time between the sampling time and start of analysis, and compare this to the required holding time. For composite samples that are collected within 24-hours or less, the time of the final sample aliquot is considered the "sample collection time" for determining sample holding time. For analytes with critical holding times (≤48 hours), composite samples lasting longer than 24-hours require multiple bottle composite samples. Each of these composite samples should represent less than 24 hours of monitored flow, and subsamples from the composites should have been poured off and analyzed by the laboratory for those constituents with critical holding times (***see Section 12***). It is important to review sample holding times to ensure that analyses occurred within the time period that is generally accepted to maintain stable parameter concentrations. Table 12-1 contains the holding times for selected parameters. If holding times are exceeded, inaccurate concentrations or false negative results may be reported.

Samples that exceed their holding time prior to analysis are qualified as "estimated", or may be rejected depending on the circumstances.

Contamination

Blank samples are used to identify the presence and potential source of sample contamination and are typically one of four types:

1. ***Method blanks*** are prepared and analyzed by the laboratory to identify laboratory contamination.
2. ***Field blanks*** are prepared by the field crew during sampling events and submitted to the laboratory to identify contamination occurring during the collection or the transport of environmental samples.
3. ***Equipment blanks*** are prepared by the field crew or laboratory prior to the monitoring season and used to identify contamination coming from sampling equipment (tubing, pumps, bailers, etc.).
4. ***Trip blanks*** are prepared by the laboratory, carried in the field, and then submitted to the laboratory to identify contamination in the transport and handling of volatile organics samples.
5. ***Filter blanks*** are prepared by field crew or lab technicians performing the sample filtration. Blank water is filtered in the same manner and at the same time as other environmental samples. Filter blanks are used to identify contamination from the filter or filtering process.

If no contamination is present, all blanks should be reported as "not detected" or "non-detect" (e.g., constituent concentrations should not be detected above the reporting limit). Blanks reporting detected concentrations ("hits") should be noted in the written QA/QC data summary prepared by the data reviewer. In the case that the laboratory reports hits on method blanks, a detailed review of raw laboratory data and procedures should be requested from the laboratory to identify any data reporting errors or contamination sources. When other types of blanks are reported above the reporting limit, a similar review should be requested along with a complete review of field procedures and sample handling. Often times it will also be necessary to refer to historical equipment blank results, corresponding method blank results, and field notes to identify contamination sources. This is a corrective and documentative step that should be done as soon as the hits are reported.

If the blank concentration exceeds the laboratory reporting limit, values reported for each associated environmental sample must be evaluated according to USEPA guidelines for data evaluations of organics and metals (USEPA, 1991; USEPA, 1995) as indicated in Table 13-1.

Table 13-1. USEPA Guidelines for Data Evaluation

Step	***Environmental Sample***	***Phthalates and other common contaminants***	***Other Organics***	***Metals***
1.	Sample > 10X blank concentration	No action	No action	No action
2.	Sample < 10X blank concentration	Report associated environmental results as "non-detect" at the reported environmental concentration.	No action	Results considered an "upper limit" of the true concentration (note contamination in data quality evaluation narrative).
3.	Sample < 5X blank concentration	Report associated environmental results as "non-detect" at the reported environmental concentration.	Report associated environmental results as "non-detect" at the reported environmental concentration.	Report associated environmental results as "non-detect" at the reported environmental concentration.

Specifically, if the concentration in the environmental sample is less than five times the concentration in the associated blank, the environmental sample result is considered, for reporting purposes, "not-detected" *at the environmental sample result concentration* (phthalate and other common contaminant results are considered non-detect if the environmental sample result is less than ten times the blank concentration). The laboratory reports are not altered in any way. The qualifications resulting from the data evaluation are made to the evaluator's data set for reporting and analysis purposes to account for the apparent contamination problem. For example, if dissolved copper is reported by the laboratory at 4 μg/L and an associated blank concentration for dissolved copper is reported at 1 μg/L, data qualification would be necessary. In the data reporting field of the database (see ***Section 14***), the dissolved copper result would be reported as 4 μg/L***)***, the numerical qualifier would be reported as "<", the reporting limit would be left as reported by the laboratory, and the value qualifier would be reported as "U" ("not detected above the reported environmental concentration").

When reported environmental concentrations are greater than five times (ten times for phthalates) the reported blank "hit" concentration, the environmental result is reported unqualified at the laboratory-reported concentration. For example, if dissolved copper is reported at 11 μg/L and an associated blank concentration for dissolved copper is reported at 1 μg/L, the dissolved copper result would still be reported as 11 μg/L.

Precision

Duplicate samples provide a measure of the data precision (reproducibility) attributable to sampling and analytical procedures. Precision can be calculated as the relative percent difference (RPD) in the following manner:

$$RPD_i = \frac{2 * |O_i - D_i|}{(O_i + D_i)} * 100\%$$

where:

RPD_i = Relative percent difference for compound i

O_i = Value of compound i in original sample

D_i = Value of compound i in duplicate sample

The resultant RPDs should be compared to the criteria specified in the project's DQOs. The DQO criteria shown in Table 13-2 below are based on the analytical method specifications and laboratory-supplied values. Project-specific DQOs should be developed with consideration to the analytical laboratory, the analytical method specifications, and the project objective. Table 13-2 should be used as a reference point as the least stringent set of DQO criteria for Caltrans monitoring projects.

<u>Laboratory and Field Duplicates</u>

Laboratory duplicates are samples that are split by the laboratory. Each half of the split sample is then analyzed and reported by the laboratory. A pair of field duplicates is two samples taken at the same time, in the same manner into two unique containers. Subsampling duplicates are two unique, ostensibly identical, samples taken from one composite bottle (see ***Section 10***). Laboratory duplicate results provide information regarding the variability inherent in the analytical process, and the reproducibility of analytical results. Field duplicate analysis measures both field and laboratory precision, therefore, it is expected that field duplicate results would exhibit greater variability than lab duplicate results. Subsampling duplicates are used as a substitute for field duplicates in some situations and are also an indicator of the variability introduced by the splitting process.

The RPDs resulting from analysis of both laboratory and field duplicates should be reviewed during data evaluation. Deviations from the specified limits, and the effect on reported data, should be noted and commented upon by the data reviewer. Laboratories typically have their own set of maximum allowable RPDs for laboratory duplicates based on their analytical history. In most cases these values are more stringent than those listed in Table 13-2. Note that the laboratory will only apply these maximum allowable RPDs to laboratory duplicates. In most cases field duplicates are submitted "blind" (with pseudonyms) to the laboratory.

Environmental samples associated with laboratory duplicate results greater than the maximum allowable RPD (when the numerical difference is greater than the reporting limit) are qualified as "J" (estimated). When the numerical difference is less than the RL, no qualification is necessary. Field duplicate RPDs are compared against the maximum allowable RPDs used for laboratory duplicates to identify any pattern of problems with reproducibility of results. Any significant pattern of RPD exceedances for field duplicates should be noted in the data report narrative.

Corrective action should be taken to address field or laboratory procedures that are introducing the imprecision of results. The data reviewer can apply "J" (estimated) qualifiers to any data points if there is clear evidence of a field or laboratory bias issue that is not related to contamination. (Qualification based on contamination is assessed with blank samples.)

Laboratories should provide justification for any laboratory duplicate samples with RPDs greater than the maximum allowable value. In some cases, the laboratory will track and document such exceedances, however; in most cases it is the job of the data reviewer to locate these out-of-range RPDs. When asked to justify excessive RPD values for field duplicates, laboratories most often will cite sample splitting problems in the field. Irregularities should be included in the data reviewer's summary, and the laboratory's response should be retained to document laboratory performance, and to track potential chronic problems with laboratory analysis and reporting.

Accuracy

Accuracy is defined as the degree of agreement of a measurement to an accepted reference or true value. Accuracy is measured as the percent recovery (%R) of spike compound(s). Percent recovery of spikes is calculated in the following manner:

$$\%R = 100\% * [(C_s - C) / S]$$

where:

$\%R$ = percent recovery

C_s = spiked sample concentration

C = sample concentration for spiked matrices

S = concentration equivalent of spike added

Accuracy (%R) criteria for spike recoveries should be compared with the limits specified in the project DQOs. A list of typical acceptable recoveries is shown in Table 13-2. As in the case of maximum allowable RPDs, laboratories develop acceptable criteria for an allowable range of recovery percentages that may differ from the values listed in Table 13-2.

Percent recoveries should be reviewed during data evaluation, and deviations from the specified limits should be noted in the data reviewer's summary. Justification for out of range recoveries should be provided by the laboratory along with the laboratory reports, or in response to the data reviewer's summary.

Laboratory Matrix Spike and Matrix Spike Duplicate Samples

Evaluation of analytical accuracy and precision in environmental sample matrices is obtained through the analysis of laboratory matrix spike (MS) and matrix spike duplicate (MSD) samples. A matrix spike is an environmental sample that is spiked with a known amount of the constituent being analyzed. A percent recovery can be calculated from the results of the spike analysis. A MSD is a duplicate of this analysis that is performed as a check on matrix recovery precision. MS and MSD results are used together to calculate RPD as with the duplicate samples. When MS/MSD results (%R and RPD) are outside the project specifications, as listed in Table 13-2, the associated environmental samples are qualified as "estimates due to matrix interference". Surrogate standards are added to all environmental and QC samples tested by gas chromatography (GC) or gas chromatography-mass spectroscopy (GC-MS). Surrogates are non-target compounds that are analytically similar to the analytes of interest. The surrogate compounds are spiked into the sample prior to the extraction or analysis. Surrogate recoveries are evaluated with respect to the laboratory acceptance criteria to provide information on the extraction efficiency of every sample.

External Reference Standards

External reference standards (ERS) are artificial certified standards prepared by an external agency and added to a batch of samples. ERS's are not required for every batch of samples, and are often only run quarterly by laboratories. Some laboratories use ERS's in place of laboratory control spikes with every batch of samples. ERS results are assessed the same as laboratory control spikes for qualification purposes (see below). The external reference standards are evaluated in terms of accuracy, expressed as the percent recovery (comparison of the laboratory results with the certified concentrations). The laboratory should report all out-of-range values along with the environmental sample results. ERS values are qualified as biased high" when the ERS recovery exceeds the acceptable recovery range and "biased low" when the ERS recovery is smaller than the recovery range.

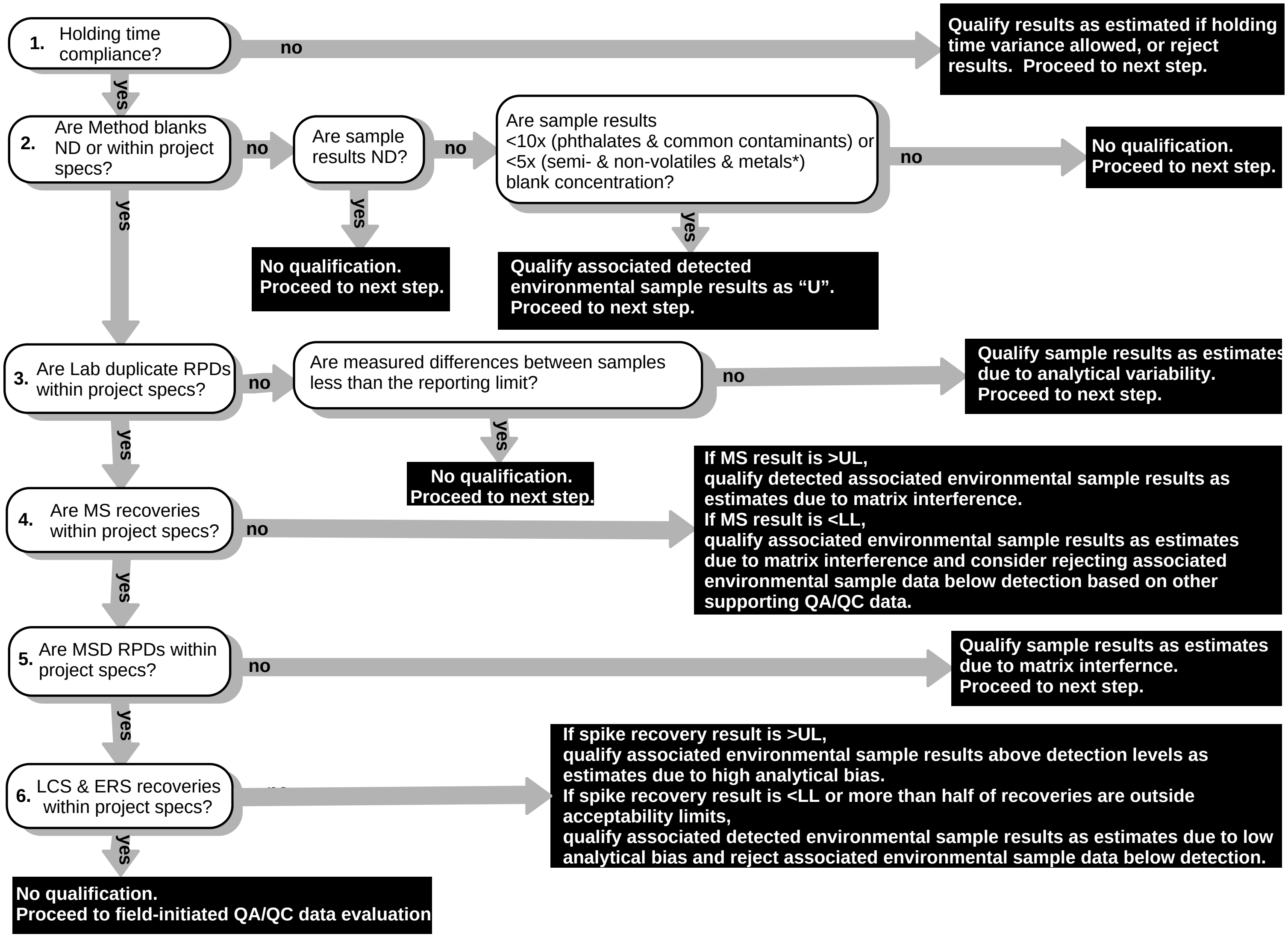
Laboratory Control Samples

LCS analysis is another batch check of recovery of a known standard solution that is used to assess the accuracy of the entire recovery process. LCSs are much like ERS's except that a certified standard is not necessarily used with LCSs, and the sample is prepared internally by the laboratory so the cost associated with preparing a LCS sample is much lower than the cost of ERS preparation. LCSs are reviewed for percent recovery within control limits provided by the laboratory. LCS out-of-range values are treated in the same manner as ERS out-of-range values. Because LCS and ERS analysis both check the entire recovery process, any irregularity in these results supersedes other accuracy-related qualification. Data are rejected due to low LCS recoveries when the associated environmental result is below the reporting limit.

A flow chart of the data evaluation process, presented on the following pages as Figures 13-1 (lab-initiated QA/QC samples) and 13-2 (field-initiated QA/QC), can be used as a general guideline for data evaluation. Boxes shaded black in Figures 13-1 and 13-2 designate final results of the QA/QC evaluation.

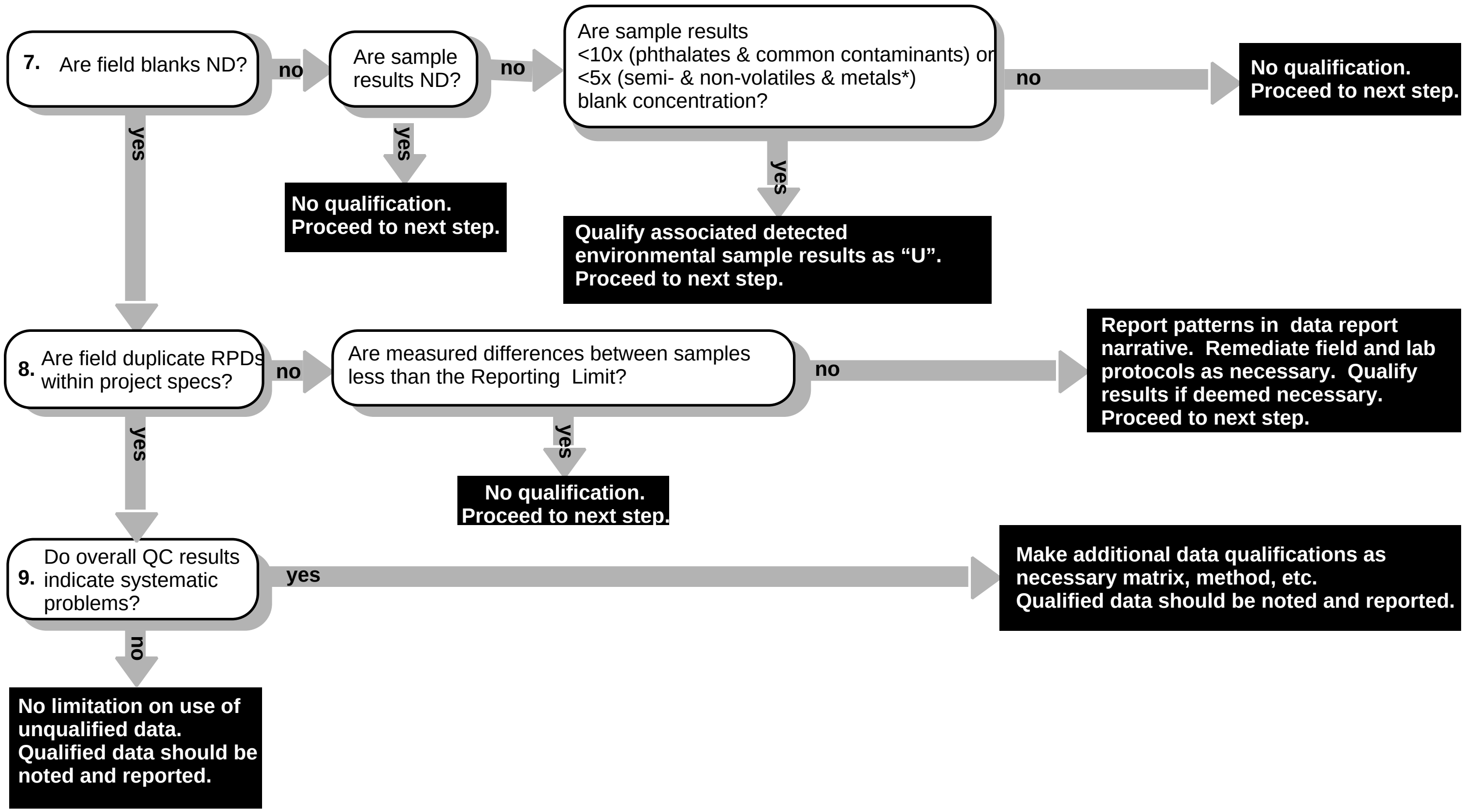
Table 13-2. Typical Control Limits for Precision and Accuracy for Analytical Constituents

Analyte	*EPA Method Number or Standard Method*	*Maximum Allowable RPD*	*Recovery Upper Limit*	*Recovery Lower Limit*
Conventionals				
BOD	405.1; SM 5210B	20%	80%	120%
COD	410.1; 410.4; SM 5220C; SM 5220D	20%	80%	120%
Hardness	130.2; 130.1; SM 2340B	20%	80%	120%
pH	150.1	20%	NA	NA
TOC/DOC	415.1	15%	85%	115%
TDS	160.1	20%	80%	120%
TSS	160.2	20%	80%	120%
Turbidity	180.1	20%	NA	NA
Nutrients				
NH3-N	350.2; 350.3	20%	80%	120%
NO3-N	300.0	20%	80%	120%
NO2-N	300.0	20%	80%	120%
NO3/NO2-N	353.2	20%	80%	120%
P	365.2	20%	80%	120%
Ortho-P	365.2; 365.3	20%	80%	120%
TKN	351.3	20%	80%	120%
Metals				
Ag	272.2; 200.8	20%	75%	125%
Al	200.9; 200.8	20%	75%	125%
Cd	213.2; 200.8	20%	75%	125%
Cr	218.2; 200.8	20%	75%	125%
Cu	220.2; 200.8	20%	75%	125%
Ni	249.2; 200.8	20%	75%	125%
Pb	239.2; 200.8	20%	75%	125%
Zn	289.2; 200.8	20%	75%	125%
As	206.3; 200.8	20%	75%	125%
Fe	200.9; SM 3500-Fe B	20%	75%	125%
Se	200.9; 270.3; 200.8	20%	75%	125%
Hg	1631	21%	79%	121%
Total Petroleum Hydrocarbons				
TPH (gasoline)	8015b	21%	45%	129%
TPH (diesel)		21%	45%	129%
TPH (motor oil)		21%	45%	129%
Oil & Grease	1664	18%	79%	114%
Pesticides and Herbicides				
Glyphosate	547	30%	70%	130%
OP Pesticides (esp. diazinon and chlorpyrifos)	8141; ELISA	25%	see method for constituent specific	
OC Pesticides	8081	25%		
Chlorinated Herbicides	8150; 8151	25%		
Carbamate Pesticides	8321	25%		
Miscellaneous Organic Constituents				
Base/Neutrals and Acids	625; 8270	30% to 50% (analyte dependent)	see method for constituent specific	
PAHs	8310			
Purgeables	624; 8260	20%		
Purgeable Halocarbons	601	30%	see method, Table 2	
Purgeable Aromatics	602	20%	see method for constituent specific	
Miscellaneous Constituents				
Cyanide	335.2	20%	75	125
Bacteriological				
Fecal Coliform	SM 9221E	-	-	-
Total Coliform	SM 9221B	-	-	-



*Environmental results between 5x and 10x the blank concentration are qualified as “an upper limit on the true concentration” and the data user should be cautioned.

Figure 13-1. Technical Data Evaluation for Lab-Initiated QA/QC Samples



*Environmental results between 5x and 10x the blank concentration are qualified as "an upper limit on the true concentration" and the data user should be cautioned.

Figure 13-2. Technical Data Evaluation for Field-Initiated QA/QC Samples

Attachment G: Los Angeles County Flood Control District Background Information

In 1915, the Los Angeles County Flood Control Act established the Los Angeles County Flood Control District (LACFCD) and empowered it to manage flood risk and conserve stormwater for groundwater recharge. In coordination with the United States Army Corps of Engineers the LACFCD developed and constructed a comprehensive system that provides for the regulation and control of flood waters through the use of reservoirs and flood channels. The system also controls debris, collects surface storm water from streets, and replenishes groundwater with stormwater and imported and recycled waters. The LACFCD covers the 2,753 square-mile portion of Los Angeles County south of the east-west projection of Avenue S, excluding Catalina Island. It is a special district governed by the County of Los Angeles Board of Supervisors, and its functions are carried out by the Los Angeles County Department of Public Works. The LACFCD service area is shown in **Figure G-1.**

Unlike cities and counties, the LACFCD does not own or operate any municipal sanitary sewer systems, public streets, roads, or highways. The LACFCD operates and maintains storm drains and other appurtenant drainage infrastructure within its service area. The LACFCD has no planning, zoning, development permitting, or other land use authority within its service area. The permittees that have such land use authority are responsible under the Permit for inspecting and controlling pollutants from industrial and commercial facilities, development projects, and development construction sites. (Permit, Part II.E, p. 17.)

The MS4 Permit language clarifies the unique role of the LACFCD in stormwater management programs: "[g]iven the LACFCD's limited land use authority, it is appropriate for the LACFCD to have a separate and uniquely-tailored storm water management program. Accordingly, the stormwater management program minimum control measures imposed on the LACFCD in Part VI.D of this Order differ in some ways from the minimum control measures imposed on other Permittees. Namely, aside from its own properties and facilities, the LACFCD is not subject to the Industrial/Commercial Facilities Program, the Planning and Land Development Program, and the Development Construction Program. However, as a discharger of storm and non-storm water, the LACFCD remains subject to the Public Information and Participation Program and the Illicit Connections and Illicit Discharges Elimination Program. Further, as the owner and operator of certain properties, facilities and infrastructure, the LACFCD remains subject to requirements of a Public Agency Activities Program." (Permit, Part II.F**,** p. 18.)

Consistent with the role and responsibilities of the LACFCD under the Permit, the [E]WMPs and CIMPs reflect the opportunities that are available for the LACFCD to collaborate with permittees having land use authority over the subject watershed area. In some instances, the opportunities are minimal, however the LACFCD remains responsible for compliance with certain aspects of the MS4 permit as discussed above.

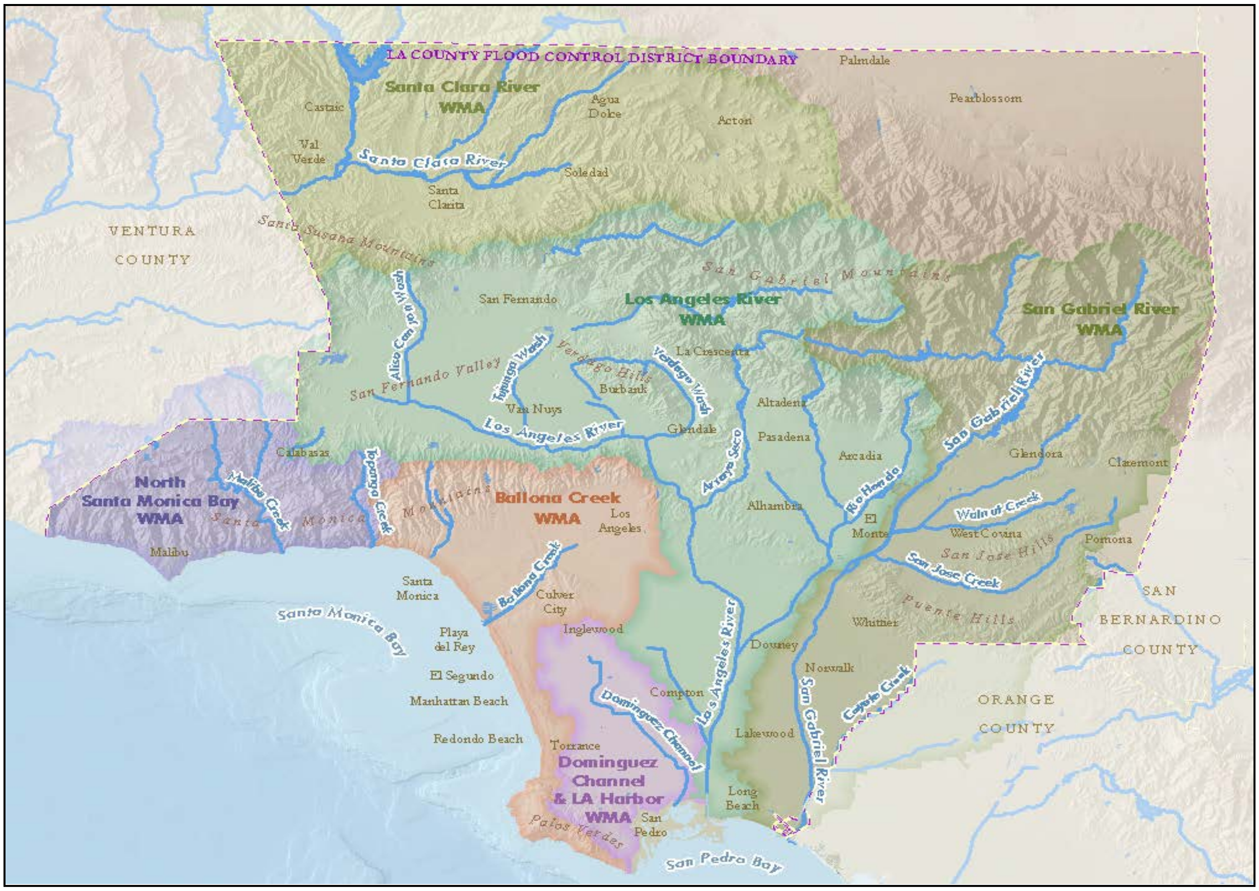


Figure G-1. Los Angeles County Flood Control District Service Area